SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM

CONTRIBUTIONS

FROM THE

UNITED STATES NATIONAL HERBARIUM

VOLUME 23, PART 4

TREES AND SHRUBS OF MEXICO

(PASSIFLORACEAE–SCROPHULARIACEAE)

By PAUL C. STANDLEY

WASHINGTON
GOVERNMENT PRINTING OFFICE
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PREFACE.

The fourth installment of the Trees and Shrubs of Mexico, by Mr. Paul C. Standley, Associate Curator of the United States National Herbarium, treats the families Passifloraceae to Scrophulariaceae. Several large families are included, notably the Cactaceae, of which Mexico possesses a far greater number of species than does any other part of the earth. Other important groups covered are the Myrtaceae, Melastomaceae, Asclepiadaceae, and Verbenaceae, families whose Mexican representatives have received little systematic attention during the last 30 years or more.

The account of the family Passifloraceae has been furnished by Mr. Ellsworth P. Killip, and that of the Cactaceae by Dr. N. L. Britton and Dr. J. N. Rose.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

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TREES AND SHRUBS OF MEXICO [1]

By Paul C. Standley.

113. PASSIFLORACEAE. Passionflower Family.

(Contributed by Mr. Ellsworth P. Killip.)

Reference: Masters in Mart. Fl. Bras. 13[1]: 530–627. 1872.

1. PASSIFLORA L. Sp. Pl. 955. 1753.

Usually scandent herbs, frequently woody at base, rarely shrubs; leaves alternate, stipulate, petiolate, entire, lobed, or divided; inflorescence axillary, the peduncles usually in pairs and 1-flowered; flowers perfect, often showy; sepals 5; petals 5 or wanting; fruit variable, indehiscent, pulpy within.

About 40 species of this genus occur in Mexico, but only two can properly be considered shrubs.

Flowers less than 4 cm. wide; petals obovate, less than twice as long as filaments of corona ..... 1. **P. fruticosa.**
Flowers more than 6 cm. wide; petals linear, more than twice as long as filaments of corona ..... 2. **P. palmeri.**

1. Passiflora fruticosa Killip, Journ. Washington Acad. Sci. 12: 256. 1922.

Baja California.

Low shrub with an erect caudex, 20 to 40 cm. high, and a few short sprawling branches, densely lanate throughout; leaves 1.5 to 2 cm. long, 3-lobed; peduncles 1 to 2.5 cm. long.

2. Passiflora palmeri Rose, Contr. U. S. Nat. Herb. 1: 131. 1892.

Baja California; type from Carmen Island.

Low flat-topped shrub, 50 cm. high, 80 to 120 cm. wide; leaves 1.5 to 4 cm. long, 2 to 5 cm. broad; peduncles 4 to 5 cm. long; sepals and petals white; corona filaments blue and white. "Sandía de la Pasión."

114. CARICACEAE. Papaw Family.

Reference: Solms-Laubach in Mart. Fl. Bras. 13[3]: 175–196. 1889.

Trees or shrubs, rarely herbs, with milky juice; leaves alternate, long-petiolate, digitately compound, or simple and usually deeply lobate, without stipules; flowers perfect or more commonly unisexual and dioecious, the pistillate solitary and axillary or in few-flowered panicles; calyx small, rotate or campanulate, 5-lobate; staminate corolla with an elongate tube, the limb 5-lobate; pis-

[1] The first installment of the Trees and Shrubs of Mexico comprising the families Gleicheniaceae to Betulaceae, was published as Part 1 of Volume 23, Contributions from the U. S. National Herbarium, pp. 1–170, October 11, 1920; the second, including the families Fagaceae, to Fabaceae, as Part 2, pp. 171-515, July 14, 1922; the third, including the families Oxalidaceae to Turneraceae, as Part 3, pp. 517–848, July, 1923.

tillate corolla of 5 nearly distinct, narrow segments; stamens 10, inserted in the corolla throat in 2 series; fruit baccate, large, 1 or 5-celled.

Leaves digitately compound. Corolla lobes opposite the calyx lobes; stamens distinct ----------1. **LEUCOPREMNA.**
Leaves simple, often deeply lobate.
Plants trees, with simple trunks; stamens distinct; calyx lobes alternating with the corolla lobes; fruit not appendaged----------2. **CARICA.**
Plants herbaceous, with tuberous roots; stamens united at base; calyx lobes opposite the corolla lobes; fruit with an appendage at the base of each angle ----------3. **JARILLA.**

1. **LEUCOPREMNA** Standl., gen. nov.

Only the following species is known. By most authors it has been referred to the genus *Jacaratia*, but it seems necessary to place it in a separate genus.

1. **Leucopremna mexicana** (A. DC.) Standl.

Jacaratia mexicana A. DC. in DC. Prodr. 15[1]: 420. 1864.

Jacaratia conica Kerber, Jahrb. Bot. Gart. Berlin 2: 282. 1883.

Carica heptaphylla Sessé & Moc. Pl. Nov. Hisp. 172. 1887. Not *C. heptaphylla* Vell. 1825.

Pileus heptaphyllus Ramírez, Naturaleza II. 3: 711. 1903.

Colima, Guerrero, Morelos, Campeche, and Yucatán; said to occur in Oaxaca, and probably to be found elsewhere. El Salvador; reported from Nicaragua, and apparently also in Costa Rica.

Tree, 4.5 to 12 meters high, the trunk very thick at base, tapering upward and dividing into few heavy branches, the twigs thick and soft, the wood very soft, the trunk consisting largely of pith; bark smooth, gray; leaves deciduous, clustered at the ends of the branchlets, the leaflets 5 to 7, obovate, acuminate, 10 cm. long and 6 cm. wide or smaller; flowers dioecious, the staminate in terminal or axillary panicles, pale yellow, the corolla about 2 cm. long; stamens 10, free; pistillate flowers terminal, long-pedunculate, the petals greenish, 4 cm. long; fruit 15 cm. long or more, 8 to 10 cm. thick, 5-celled, pendent, conic or ovoid-oblong, 5-angled, the angles often produced below into conelike protuberances or wings, the skin green or yellow; seeds rough, black. "Bonete" (Yucatán, Campeche, Morelos); "kunché" or "kumché" (Yucatán, Maya); "cuaguayote" or "coahuayote" (Colima); "coalsuayote" (Guerrero); "orejona," "papaya orejona," "papayo montés" (Oaxaca); "cuayote" (El Salvador).

In outward appearance the fruit is not unlike a large green pepper of the bullnose type, but it varies greatly in shape, being sometimes long, narrow, and twisted. The flesh is sweet and reddish yellow; it is eaten cooked or as a salad, and is made into sweetmeats. The juice is said to have the same properties as that of *Carica papaya*. Kerber reports that in Colima a kind of tortilla is made from the starch of the trunk. The tree has been described at length by Ramírez,[1] and illustrated with several excellent plates. It is treated by Hernández under the name "quaiuhayoth."

Leucopremna mexicana is abundant in extreme western Salvador, occurring as a characteristic tree on the arid hills near the Río Paz, close to the Guatemalan frontier.

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[1] José Ramírez, El *Pileus heptaphyllus*, Naturaleza II. 3: 707–711. *pl. 41–45.* 1903.

2. CARICA L. Sp. Pl. 1036. 1753.

Trees with simple trunks; leaves simple, deeply incised-lobate; flowers usually dioecious, axillary; fruit 1 or 5-celled.

The genus consists of about 25 species, all natives of tropical America.

Fruit 5-celled; stigmas lobed only at apex ..... 1. C. cauliflora.
Fruit 1-celled; stigmas irregularly divided or dichotomous almost or quite to the base ..... 2. C. papaya.

1. **Carica cauliflora** Jacq. Pl. Hort. Schönbr. 3: 33. *pl. 311.* 1776.
Vasconcellea boissieri A. DC. in DC. Prodr. 15[1]: 415. 1864.
Carica boissieri Hemsl. Biol. Centr. Amer. Bot. 1[2]: 481. 1880.

Veracruz and Chiapas, and probably elswhere; cultivated and perhaps also native. Central America, Colombia, and Venezuela.

Trunk about 3.5 meters high, leafy at the top; leaves large, cordate at base, lobed halfway to base or less, the lobes acuminate and with remote acuminate teeth, glabrous; flowers inodorous, the staminate 3 to 3.5 cm. long, the pistillate flowers of about the same size; fruit ovoid, pointed, narrowed at base, yellow, 8 cm. long or larger. "Papayo de montaña" (El Salvador).

2. **Carica papaya** L. Sp. Pl. 1036. 1753.
Papaya vulgaris DC. in Lam. Encycl. 5: 2. 1804.
Carica quinqueloba Sessé & Moc. Fl. Mex. 255. 1896.

Commonly cultivated in all the warmer parts of Mexico and wild in many places. Southern Florida, West Indies, and Central and South America; cultivated in the tropics of the Old World.

Trunk sometimes 9 meters high and 25 cm. in diameter, pale green, the woody tissue thin and porous, the pith large, the trunk with a large central cavity; leaves borne at the top of the trunk, 20 to 60 cm. wide, deeply lobed, the lobes pinnately lobed, glaucous beneath; flowers yellow, the staminate in slender panicles 10 to 30 cm. long, fragrant, the corolla 2 to 3 cm. long; pistillate flowers solitary or in 2 or 3-flowered cymes, the petals linear-lanceolate, 2 to 2.5 cm. long; fruit oblong or obvoid, 5 to 10 cm. long or often much larger, pointed, yellow or orange, with thick skin, the flesh firm, sweet and insipid; seeds numerous, black, rough.

Known generally in Spanish-speaking countries as "papaya,"[1] which is believed to be a corruption of the Carib "ababai;" the English names "papaw" or "pawpaw"[2] are used, also "tree-melon," but "papaya" is the preferable name. The following additional names are reported. "Chick put," "put" (Yucatán, Maya; the former a wild form); "papaya de los pájaros" (Yucatán, a wild form); "papayero" (the plant); "melón zapote" (various parts of Mexico; sometimes corrupted into "melón chapote"); "manón" (Argentina); "papaya montés" (a wild form); "fruta bomba" (Cuba); "dzoosadzahuidium" (Oaxaca, Mixtec, *Reko*); "lechosa" (Porto Rico). It is remarkable that no Nahuatl name is known for the plant.

The papaya is one of the best-known of tropical American fruits. The fruits vary greatly in shape, size, and quality; they sometimes attain a length of 50 cm. and a weight of 20 pounds. They resemble some forms of muskmelons, especially on the inside. The flesh is 2 to 5 cm. thick and orange-yellow or deep orange. The fruit is eaten like a muskmelon or sliced and served with sugar and cream, made into salads, or candied; made into

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[1] This is the name for the fruit; that of the plant is "papayo."

[2] Not to be confused with the "pawpaw" of the Southern United States, which is *Asimina triloba* (L.) Dunal, a plant of the family Annonaceae.

preserves, pickles, jellies, pies, or sherbets; or sometimes cooked and eaten like a vegetable. The plants grow easily and rapidly from seeds, and they bear fruit almost throughout the year.[1] A confection is sometimes made by boiling the flowers in syrup.

The fruit and other parts of the plant contain an abundant milky juice from which an enzyme, papain, resembling animal pepsin in its digestive action, has been separated. This product has become an article of commerce, being used for the treatment of dyspepsia and related affections, and also for clarifying beer. The digestive properties of the juice were well known to the original inhabitants of tropical America, like those of to-day, who often wrap meat in the leaves and leave it thus over night, to make it tender. Sometimes leaves are boiled with meat for this purpose, but if too much papaya juice comes in contact with the meat, or for too long a time, the meat will fall apart in shreds. Indeed, it is even popularly believed that the plant is even more efficient, for it is said that if old hogs and poultry are fed on the leaves and fruit, their flesh will become tender, and if a piece of tough meat is hung among the leaves of the tree for a few hours it also will be made tender. This last property is attested by so eminent an authority as Heber Drury, who states that he proved it by experiment. The leaves are sometimes used in Mexico as a substitute for soap in washing clothes.

Various medicinal properties are attributed to the papaya plant. The seeds and the milk from the roots are often employed as a vermicide, and the milk is applied to the skin to assist in the removal of chiggers. The infusion of the flowers is reported to have emmenagogue, febrifuge, and pectoral properties; a decoction of the leaves is employed as a remedy for asthma; and the juice is administered for indigestion. Grosourdy states that the juice of the ripe fruit was used as a cosmetic, to remove freckles.

The papaya is treated at length by Oviedo (Lib. VIII, Cap. XXXIII), who states that in Hispaniola it was known as "papaya," but among the Spaniards of the mainland it was called "higos de mastuerzo," the latter name being given because the seeds had a pungent flavor like cress (*mastuerzo*). In Nicaragua, he states, the plant or fruit was called "olocotón." He claims also that the plants were not native in the West Indies, but were brought there by the Spaniards from the mainland, which may or may not be true. The plant is mentioned by all the early writers, and is described by Hernández.[2]

Ramírez has described and illustrated[3] a fruit known as "papaya voladora," which is presumably a form of this species. It is noteworthy in having peduncles as much as 34 cm. long. The flowers of *Carica papaya* are usually dioecious, but occasionally both kinds of flowers are found upon the same plant.

DOUBTFUL SPECIES.

CARICA BOURGAEI Solms in Mart. Fl. Bras. **13**[3]: 178. 1889. This name is used by Solms in his key to the species of the genus, but, so far as the writer can learn, no description has ever been published. The species was probably based upon a specimen from the Valley of Córdoba, Veracruz, and the plant is closely related to *C. papaya*.

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[1] For a general account of the papaya and methods of cultivation see F. W. Popenoe in Bailey, Stand. Cycl. Hort. 2460–2462. 1916.

[2] Thesaurus 99, 365. 1651.

[3] Naturaleza **II. 3**: 548–549. *pl. 32*. 1901.

3. JARILLA Rusby, Torreya 21: 47. 1921.

Plants herbaceous, glabrous, branched, from tuberous rhizomes; leaves simple, entire, toothed, or lobed; flowers dioecious, axillary, the staminate in long-pedunculate panicled cymes, the calyx minute, the corolla funnelform, with a slender tube; stamens 10, the filaments united at base, hairy, the alternate ones longer; pistillate flowers usually solitary, slender-pedicellate; fruit pendent, 1-celled, 5-angulate, each angle produced at base into a long recurved fleshy appendage, the style persistent and elongate; stigmas entire.

The genus, so far as known, is confined to Mexico. It was discussed at length by Ramírez,[1] who gives excellent illustrations of both the species.

Leaves hastate, the basal lobes narrow, elongate, acute; fruit only slightly contracted above the appendages ..... 1. J. heterophylla.
Leaves various but not hastate, the basal lobes, if any, obtuse or rounded; fruit strongly contracted above the appendages ..... 2. J. caudata.

1. Jarilla heterophylla (Llave) Rusby, Torreya 21: 50. 1921.

Mocinna heterophylla Llave, Registro Trimestre, June 12, 1832.

Carica nana Benth. Pl. Hartw. 288. 1848.

Jalisco and Guanajuato; type from Guanajuato.

Plants said to be sometimes scandent, slender; leaves hastate, 2.5 to 10 cm. long, acute or attenuate, entire or with a few large remote teeth, pale beneath; staminate corolla 5 mm. long, the lobes as long as the tube; fruit subglobose, 2.5 cm. in diameter, with short thick appendages. "Jarrilla," "granadilla."

The writer has seen only a single specimen of this species, consisting of staminate plants from La Palma, Jalisco.

2. Jarilla caudata (T. S. Brandeg.) Standl.

Mocinna heterophylla sesseana Ramírez, Anal. Inst. Med. Nac. Mex. 1: 207. *pl. 2–4.* 1894.

Carica caudata T. S. Brandeg. Zoe 4: 401. 1894.

Jarilla sesseana Rusby, Torreya 21: 47. 1921.

Baja California, Sinaloa, Jalisco, and Guanajuato; type from mountains of Baja California.

Plants slender, 1 meter long or less, erect or decumbent, the root large; leaves long-petiolate, very variable, rounded-ovate to deltoid or deltoid-oblong, 2 to 12 cm. long, acute to rounded at apex, cuneate to cordate at base, entire, undulate, dentate, or lobate, pale beneath; staminate inflorescence long-pedunculate, the corolla purplish white, about 1 cm. long, the lobes much shorter than the tube; pistillate flowers usually solitary, long-pedicellate; body of the fruit ellipsoid or subglobose, sometimes 9 cm. long, the elongate fleshy style 1 to 2 cm. long, the appendages 3 to 5 cm. long; seeds surrounded by a white aril. "Jarrilla" (Guanajuato, Jalisco); said to be known as "bonete" in Jalisco.

The fruit has an odor resembling that of lemon or citron. It is usually employed for making preserves or sweetmeats, and is well known in the markets of Jalisco and Guanajuato.

The specimens which have been referred here by Ramírez and by the present writer are remarkably variable, and it is not improbable that they represent more than a single species. The writer has seen only six collections, and they are quite inadequate for critical study. It is desirable that a large series of specimens be collected of these plants, which are practically unknown outside the limited area within which they grow.

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[1] Anal. Inst. Méd. Nac. Mex. 1: 205–212. *pl. 2–5.* 1894.

115. LOASACEAE. Loasa Family.

Usually herbs but sometimes shrubs; leaves opposite or alternate, entire or toothed, estipulate; flowers perfect, racemose or cymose-paniculate, the pedicels bibracteolate; calyx tube adnate to the ovary, the limb 4 or 5-lobate; petals 4 or 5, inserted in the calyx throat; stamens few or numerous; style subulate, entire or bifid or trifid; fruit a 1-celled capsule, containing 1 to many seeds.

Several other genera are represented in Mexico by herbaceous species. Some of them are plants with stinging hairs. *Cevallia sinuata* Lag. is a common plant of the desert regions of northern Mexico, with hairs which sting as painfully as those of a nettle.

Leaves mostly opposite: stamens numerous; capsule many-seeded.
1. MENTZELIA.
Leaves alternate; stamens 4 or 5; capsule 1-seeded_____**2. PETALONYX.**

1. **MENTZELIA** L. Syst. Nat. ed. 10. 1076. 1759.

Several other representatives of the genus occur in Mexico, but they are herbs. The leaves in most species of this genus are extremely scabrous and cling tenaciously to clothing. Some of the species are known in the United States by the name of "stickleaf."

1. **Mentzelia conzattii** Greenm. Proc. Amer. Acad. **32**: 298. 1897.

Oaxaca.

Tall shrub, sometimes 7 meters high, with brittle woody stems; leaves mostly opposite, short-petiolate, lanceolate, 4 to 12 cm. long, acuminate, finely dentate, scabrous above, tomentose beneath; flowers pedicellate, cymose-paniculate, about 5 cm. broad, bright yellow; calyx lobes 5, 12 to 15 mm. long; petals oblong-obovate, acute; stamens numerous; capsule about 1 cm. long and nearly as thick. "Arnica."

The leaves and roots, Professor Conzatti states, are employed as a remedy for itch and other cutaneous diseases.

2. **PETALONYX** A. Gray, Mem. Amer. Acad. n. ser. **5**: 319. 1855.

Low shrubs or herbs; leaves alternate, entire or toothed, sessile, very scabrous; flowers very small, in dense terminal bracted spikes or racemes; calyx tube short, the lobes 4 or 5, narrow, deciduous; petals 4 or 5, clawed; stamens 4 or 5; staminodia none; fruit small, fragile, rupturing irregularly, 1-seeded.

Leaves strongly revolute, crenate_____**1. P. crenatus.**
Leaves not revolute, entire or dentate.
Leaves lanceolate or ovate, broad at base, often dentate_____**2. P. thurberi.**
Leaves linear or linear-oblanceolate, attentuate at base, entire_**3. P. linearis.**

1. **Petalonyx crenatus** A. Gray; S. Wats. Proc. Amer. Acad. **17**: 358. 1882.

Coahuila; type from San Lorenzo de Laguna.

Plants woody at base, the stems retrorse-hispidulous; leaves oblong, 4 to 8 mm. long, obtuse, retrorse-scabrous; flowers white, racemose; petals 3 to 4 mm. long.

2. **Petalonyx thurberi** A. Gray, Mem. Amer. Acad. n. ser. **5**: 319. 1855.

Baja California and northern Sonora. Arizona, Nevada, and southern California; type from the Gila River, Arizona.

Plants 1 meter high or less, chiefly or wholly herbaceous, very scabrous; leaves 1 to 4 cm. long, thick and stiff, spreading or appressed, the upper ones entire; racemes 4 cm. long or shorter; petals about 4 mm. long.

3. Petalonyx linearis Greene, Bull. Calif. Acad. 4: 188. 1885.

Baja California and adjacent islands.

Low shrub, very scabrous throughout; leaves 1 to 3 cm. long, obtuse, very thick; racemes sometimes 12 cm. long, the bracts rounded-cordate, entire; petals yellowish white, 4 to 5 mm. long.

Some of the Mexican species of *Begonia* are perhaps to be classed as shrubs, but there is no satisfactory evidence to this effect.

116. CACTACEAE. Cactus Family.

(Contributed by Dr. N. L. Britton and Dr. J. N. Rose.)

REFERENCES: Britton & Rose, The Cactaceae, vols. 1–4. 1919–23; Safford, Cactaceae of northeastern and central Mexico, Ann. Rep. Smiths. Inst. 1908: 525–563. *pl. 1–15.* 1909.

Plants perennial, succulent, usually shrublike or treelike; leaves usually none or much reduced, sometimes large and flat; spines present, variable in form and arrangement, borne upon areoles in the leaf axils; flowers usually perfect, regular or irregular, solitary or clustered, sometimes borne in a terminal specialized inflorescence known as cephalium; perianth tube none or large and elongate, with few or numerous lobes, these sometimes differentiated into sepals and petals; stamens commonly numerous, the filaments usually borne upon the throat of the perianth, the anthers small, 2-celled; style one, terminal, the stigma with 2 to many lobes; ovary 1-celled; fruit baccate, fleshy or dry, usually containing numerous seeds.

The Cactaceae constitute one of the largest and most interesting groups of Mexican plants, and they are more profusely developed in Mexico than in any other part of the earth. They are often conspicious features of the landscape, particularly in the desert regions, and they are of great economic importance. Many of the more showy ones are commonly grown in gardens for ornament.

Leaves broad, flat; flowers stalked (stalk sometimes very short). Areoles without glochids. (PERESKIEAE)_____1. **PERESKIA.**

Leaves (except in *Pereskiopsis*) terete or subterete, often wanting; flowers sessile.

Areoles with glochids; vegetative parts bearing leaves, these usually small and fugacious; flowers without a definite tube. (OPUNTIEAE.)

Leaves broad and flat_____2. **PERESKIOPSIS.**

Leaves subulate or cylindric.

Stamens much longer than the petals_____3. **NOPALEA.**

Stamens shorter than the petals.

Joints of the stems flat to terete, not ribbed_____4. **OPUNTIA.**

Joints terete, longitudinally ribbed_____5. **GRUSONIA.**

Areoles without glochids; vegetative parts usually without leaves; flowers with a definite tube (except in *Rhipsalis*). (CEREEAE.)

Perianth rotate or nearly so, without a tube. Plants slender, spineless, epiphytic, many-jointed_____54. **RHIPSALIS.**

Perianth not rotate, with a definite tube.

Areoles mostly spineless; plants with numerous joints, these flat; epiphytes.

Tube of flower definitely longer than the limb___51. **EPIPHYLLUM.**

Tube of flower not longer than the limb.

Perianth campanulate, with few segments_____52. **CHIAPASIA.**

Perianth short-funnelform, with many segments.

53. **NOPALXOCHIA.**

Areoles mostly spine-bearing; plants often not jointed, the joints not flat; plants terrestrial.
A. Flowers and spines borne at the same areoles.
B. Plants several-jointed or many-jointed, the joints elongate.
Plants vinelike, with aerial roots.
Ovary and fruit covered with large foliaceous scales, the axils neither spiny, hairy, nor bristly. Stems and branches 3-angled or 3-winged_____21. **HYLOCEREUS.**
Ovary and fruit not bearing large foliaceous scales, the axils spiny, hairy, or bristly.
Flowers elongate-funnelform.
Stems ribbed, fluted, or angled_____22. **SELENICEREUS.**
Stems winged_____23. **DEAMIA.**
Flowers short-funnelform_____24. **APOROCATUS.**
Plants erect, treelike, bushy, arching, or diffuse.
Flowers 2 to several at an areole, small.
Flowering areoles bearing many long bristles.
19. **LOPHOCEREUS.**
Flowering areoles without bristles__20. **MYRTILLOCACTUS.**
Flowers solitary at the areoles, mostly large.
Ovary naked or rarely bearing a few short scales, these sometimes subtending tufts of short hairs.
6. **CEPHALOCEREUS.**
Ovary with scales, often bearing also wool, bristles, or spines.
Ovary with scales only_____7. **ESCONTRIA.**
Ovary with scales and also with wool, felt, or spines.
Perianth short-campanulate or short-funnelform, its tube short and thick.
Plants mostly stout, columnar, and erect, ribbed or angled; roots without tubers.
Corolla short-campanulate; fruit dry.
8. **PACHYCEREUS.**
Corolla short-funnelform; fruit fleshy.
Plants columnar, with stout stems; flowers white to pink, not widely expanded.
9. **LEMAIREOCEREUS.**
Plants low; flowers pale yellow.
10. **BERGEROCACTUS.**
Plants very slender, nearly terete or with many low ribs; roots with tubers_____11. **WILCOXIA.**
Perianth funnelform, funnelform-campanulate, or salverform.
Areoles of the ovary with spines or bristles.
Plants slender, with a large fleshy root; flowers salverform._____12. **PENIOCEREUS.**
Plants stout or slender, without large fleshy roots; flowers funnelform.
Plants stout, bushy or prostrate, the spines flat, dagger-like_____13. **MACHAEROCEREUS.**
Plants slender or weak, the spines acicular or subulate.

Tube of the perianth as long as the limb or longer; plants elongate, with white flowers.
Joints ribbed——14. NYCTOCEREUS.
Joints angled——15. ACANTHOCEREUS.
Tube of the perianth mostly shorter than the limb; plants bushy, usually with scarlet flowers——16. HELIOCEREUS.
Areoles of the ovary with wool or felt.
Perianth limb regular; flowers white.
17. CARNEGIEA.
Perianth limb oblique; flowers scarlet
18. RATHBUNIA.

BB. Plants with one or few joints, the joints usually short, sometimes clustered, ribbed or rarely tubercled.
Flowers at lateral areoles——25. ECHINOCEREUS.
Flowers at central areoles.
Ovary and fruit naked.
Plants without spines.
Tubercles prominent, cartilaginous, flattened, more or less imbricate——26. ARIOCARPUS.
Tubercles low, rounded above——27. LOPHOPHORA.
Plants very spiny——28. EPITHELANTHA.
Ovary and fruit with scales.
Flowers funnelform——29. HAMATOCACTUS.
Flowers mostly campanulate, at least not long and slender.
Areoles not arranged on ribs.
Tubercles short, imbricate——30. STROMBOCACTUS.
Tubercles much elongate, slender, finger-like.
31. LEUCHTENBERGIA.
Areoles arranged on definite ribs.
Axils of scales on ovary and fruit naked.
Ribs usually continuous, rarely if ever tubercled; flowers with scarcely any tube.
Ribs usually numerous, much compressed, thin.
32. ECHINOFOSSULOCACTUS.
Ribs not so numerous, usually thick.
33. FEROCACTUS.
Ribs usually broad, tubercled; flowers with a short but definite tube——34. ECHINOMASTUS.
Axils of scales on ovary hairy, woolly, or bristly
Ribs several to many; plants very spiny.
Fruit permanently woolly, nearly dry, dehiscent by a terminal pore——35. ECHINOCACTUS.
Fruit not so woolly, somewhat fleshy, bursting irregularly——36. HOMALOCEPHALA.
Ribs few, broad; plants mostly spineless.
37. ASTROPHYTUM.

AA. Flowers and spines borne at different areoles. Plants consisting of a single joint.
Flowering areoles forming a central terminal cephalium.
38. CACTUS.

Flowering areoles at the base or on the side of the tubercles.
Ovary more or less scaly (not known in *Mamillopsis*).
Flowers with a short tube.
Spines partly hooked----------39. **ANCISTROCACTUS.**
Spines not hooked.
Tubercles not deeply grooved; fruit scaly.
40. THELOCACTUS.
Tubercles deeply grooved; fruit nearly naked.
41. NEOLLOYDIA.
Flowers with an elongate tube----------42. **MAMILLOPSIS.**
Ovary naked or nearly so.
Flowers irregular----------43. **COCHEMIEA.**
Flowers regular.
Flowers central, borne in axils of young, usually nascent tubercles.
Tubercles grooved on upper side.
Seeds mostly light brown; fruit greenish or yellowish, ripening slowly----------44. **CORYPHANTHA.**
Seeds black or dark brown; fruit red, maturing rapidly.
45. ESCOBARIA.
Tubercles not grooved on upper side.
Fruit circumscissile; tubercles fleshy; spines acicular.
46. BARTSCHELLA.
Fruit not circumscissile; tubercles woody; spines pectinate----------47. **PELECYPHORA.**
Flowers lateral, borne in axils of old and mature tubercles, these never grooved above.
Flowers large, with an elongate tube; tubercles elongate, flabby----------48. **DOLICOTHELE.**
Flowers small, campanulate; tubercles not flabby.
Hilum of seed large; spines pectinate----49. **SOLISIA.**
Hilum of seed minute; spines not pectinate.
50. NEOMAMMILLARIA.

1. **PERESKIA** Mill. Gard. Dict. Abr. ed. 4. 1754.

Leafy trees or shrubs, or sometimes clambering vines, branching and resembling other woody plants; spines in pairs or in clusters in the axils of the leaves, neither sheathed nor barbed; leaves alternate, broad, flat, deciduous, somewhat fleshy; flowers solitary, corymbose, or in panicles, terminal or axillary, wheel-shaped; stamens numerous; style one; stigma lobes linear; seeds black, glossy, with a brittle shell, the embryo strongly curved, the cotyledons leafy; seedlings without spines.

Pereskia portulacifolia (L.) Haw. has often been reported incorrectly from Mexico. The following vernacular names have been given for it: "Pitahayita de agua" (Jalisco); "pata de león," "patilón" (Oaxaca). The name "palo de puerco espino" is reported from Oaxaca for a *Pereskia* whose specific identity is doubtful.

Plants climbing vines; branches with a pair of reflexed spines at each areole----------1. P. aculeata.
Plants erect shrubs or trees: branches with straight spines at the areoles.
Petals fimbriate----------2. P. lychnidiflora.
Petals entire.

Branches with few or no spines_____3. P. tampicana.
Branches very spiny.
Leaves acuminate, cuneate at base_____4. P. zinniaeflora.
Leaves merely acute, not cuneate at base_____5. P. conzattii.

1. **Pereskia aculeata** Mill. Gard. Dict. ed. 8. 1768.
Cactus pereskia L. Sp. Pl. 469. 1753.
Pereskia pereskia Karst. Deutsch. Fl. 888. 1882.
Pereskia godseffiana Sander, Gard. Chron. III. 43: 257. 1908.
Cultivated throughout tropical America; perhaps an escape in Mexico.

Shrub, at first erect, but the branches often clambering and forming vines 3 to 10 meters long; spines on lower part of stem solitary or 2 or 3 together, slender and straight; spines in the axils of the leaves paired, rarely in threes, short, recurved; leaves short-petioled, lanceolate to oblong or ovate, short-acuminate, tapering or rounded at base, 7 cm. long or less; flowers in panicles or corymbs, white, pale yellow, or pinkish, 2.5 to 4.5 cm. broad; ovary leafy and often spiny; fruit light yellow, 1.5 to 2 cm. in diameter, when mature quite smooth; seeds black, somewhat flattened, 4 to 5 mm. in diameter. "Grosellero" (Cuba).

This species is often cultivated, the flowers being handsome, although they have an offensive odor. The fruit is edible, and is sometimes used for making preserves. The leaves are said to be employed in Brazil as a pot herb. In the British West Indies the plant is sometimes known as Barbados gooseberry or Spanish gooseberry.

2. **Pereskia lychnidiflora** DC. Prodr. 3: 475. 1828.
Mexico; known only from a drawing by Mociño and Sessé.

Evidently a tree or shrub; branches cylindric, woody; leaves 4 to 7 cm. long, oval to oblong, pointed, rounded at base, sessile; axils of leaves each bearing a stout spine 2 to 5 cm. long and several long hairs; flowers 6 cm. broad, solitary, borne at the ends of short stout branches; petals broadly cuneate, laciniate at the apex; ovary turbinate, bearing small leaves.

3. **Pereskia tampicana** Weber, Dict. Hort. Bois 939. 1898.
Reported only from Tampico, Tamaulipas.

Shrub; branches often without spines, or the spines several, needle-like, black, 2 to 3 cm. long; areoles globular, appearing as knobs along the stem; leaves about 5 cm. long, petioled; flowers 2.5 cm. long; petals entire, rose-colored.

4. **Pereskia zinniaeflora** DC. Prodr. 3: 475. 1828.
Based upon a drawing by Mociño and Sessé, and not otherwise known.

Shrub; leaves oval to oblong, 2 to 4 cm. long, acuminate, cuneate at base; spines on young branches 1 or 2 at an areole, on old branches 4 or 5, all less than 1 cm. long; flowers 5 cm. wide, rose-red; petals entire, obtuse or retuse; style and stamens very short; ovary truncate, bearing small stalked leaves.

5. **Pereskia conzattii** Britt. & Rose, Cactaceae 1: 24. 1919.
Southern Oaxaca, the type from Salina Cruz.

Tree, 8 to 10 meters high; bark of stems and branches brown and smooth; leaves orbicular to obovate, acute, 1 to 2.5 cm. long; areoles small, with short white wool and a few long hairs; spines 2 to 6 on young branches, 10 to 20 on main stem, acicular, 2 to 2.5 cm. long, at first yellowish brown, dark brown in age; ovary bearing small scales; fruit naked, pear-shaped, more or less stalked, 3 to 4 cm. long; seeds black, glossy, 3 mm. long, with a small white hilum.

2. **PERESKIOPSIS** Britt. & Rose, Smiths. Misc. Coll. 50: 331. 1907.

Trees and shrubs, in habit and foliage similar to *Pereskia;* old trunk forming a solid woody cylinder covered with bark and resembling the ordinary dicotyledonous stem; areoles circular, spine-bearing or sometimes spineless, also bearing hairs, wool, and usually glochids; flowers similar to those of *Opuntia;* ovary sessile (one species described as pedunculate), with leaves at the areoles (except in one species); fruit red; seeds bony, few, covered with matted hairs.

Stems, ovary, and often the leaves more or less pubescent.

Normal leaves long-acuminate, narrow, with narrow cuneate base.

1. P. velutina.

Normal leaves abruptly pointed, somewhat cuneate at base--2. P. diguetii.

Stems, ovary, and leaves glabrous.

Leaves, at least some of them, not much longer than broad.

Fruit without leaves----------3. P. opuntiaeflora.

Fruit with leaves subtending the areoles.

Areoles white, with few or no glochids.

Leaves orbicular or nearly so, rounded or apiculate at apex.

4. P. rotundifolia.

Leaves, at least the upper ones, obovate or elliptic, acute at both ends.

5. P. chapistle.

Areoles dark, filled with numerous brown glochids------6. P. porteri.

Leaves, at least some of them, twice as long as broad or longer.

Leaves spatulate----------7. P. spathulata.

Leaves elliptic to oblong or obovate.

Leaves pale green, glaucous----------8. P. pititache.

Leaves bright green, shining----------9. P. aquosa.

1. **Pereskiopsis velutina** Rose, Smiths. Misc. Coll. 50: 333. 1907.

Central Mexico, the type from Querétaro.

Stems weak and spreading, forming compact bushes 1 meter high or more; old stems with cherry-brown bark; young branches green, borne nearly at right angles to the old stem, velvety-pubescent; areoles bearing long white hairs, several short spines, and some glochids; leaves elliptic to ovate-elliptic, 2 to 6 cm. long by 1.5 to 2.5 cm. broad, acuminate, or acute at both ends, dull green, more or less velvety-puberulent on both surfaces; flowers sessile on the second-year branches; ovary obovoid to oblong, pubescent, bearing large leaves and areoles similar to those of the stem; leaves on ovary spreading or ascending and persisting after the flower falls; sepals green or deep and tinged with yellow; petals bright yellow. "Nopaleta," "cola de diablo."

The plant is grown in hedges about Querétaro.

2. **Pereskiopsis diguetii** (Weber) Britt. & Rose, Smiths. Misc. Coll. 50: 332. 1907.

Opuntia diguetii Weber, Bull. Mus. Hist. Nat. 4: 166. 1898.

Jalisco to Oaxaca; type collected near Guadalajara, Jalisco.

Tall shrub, larger than the preceding species; old stems reddish; branches pubescent; areoles when young filled with long cobwebby hairs, when old large and filled with short black wool; leaves elliptic to obovate, 3 to 5 cm. long, usually abruptly pointed, more or less cuneate at base; spines usually 1, rarely as many as 4, at first nearly black, in time becoming lighter, sometimes nearly 7 cm. long; glochids brownish, not very abundant; flowers yellow; fruit 3 cm. long, red, pubescent, its areoles often bearing spines as well as glochids; seeds white, 5 mm. broad, covered with matted hairs. "Tasajillo," "alfilerillo" (Jalisco).

3. **Pereskiopsis opuntiaeflora** (DC.) Britt. & Rose, Smiths. Misc. Coll. **50**: 332. 1907.

Pereskia opuntiaeflora DC. Prodr. **3**: 475. 1828.

Opuntia golziana Schum. Gesamtb. Kakt. 654. 1898.

Based upon a drawing of a Mexican plant by Sessé and Mociño, and not otherwise known.

Shrubby, glabrous; leaves obovate, mucronate, often in pairs; spines, when present, solitary, elongate, 2 to 3 times as long as the leaves; flowers subterminal, short-pedunculate; petals numerous, ovate, subacute, reddish yellow, arranged in two series; ovary leafless, bearing areoles filled with glochids.

4. **Pereskiopsis rotundifolia** (DC.) Britt. & Rose, Smiths. Misc. Coll. **50**: 333. 1907.

Pereskia rotundifolia DC. Prodr. **3**: 475. 1828.

Opuntia rotundifolia Schum. Gesamtb. Kakt. 652. 1898.

Based upon an illustration by Mociño and Sessé of a Mexican plant; perhaps occurring in Oaxaca.

Stem thick, more or less woody; branches slender, glabrous; leaves nearly orbicular, mucronate; spines elongate, solitary; flowers 3 cm. broad, borne on the second-year branches; petals reddish yellow, broad, with mucronate tips; ovary leafy; fruit obovoid, red, leafy.

5. **Pereskiopsis chapistle** (Weber) Britt. & Rose, Smiths. Misc. Coll. **50**: 331. 1907.

Opuntia chapistle Weber; Goss. Bull. Mus. Hist. Nat. **10**: 388. 1904.

Oaxaca and probably Morelos; type from Oaxaca.

A large branching shrub, sometimes 3 to 4 meters high, the branches widely spreading, glabrous; spines single, white, long (6 cm.), very stout; leaves fleshy, somewhat persistent, obovate to elliptic, sometimes nearly orbicular, 3 to 4 cm. long, glabrous; flowers yellow; fruit red. "Chapiztli."

6. **Pereskiopsis porteri** (T. S. Brandeg.) Britt. & Rose, Smiths. Misc. Coll. **50**: 332. 1907.

Opuntia porteri T. S. Brandeg.; Weber, Dict. Hort. Bois 899. 1898.

Opuntia brandegeei Schum. Gesamtb. Kakt. 653. 1898.

Pereskiopsis brandegeei Britt. & Rose, Smiths. Misc. Coll. **50**: 331. 1907.

Sinaloa and southern Baja California; type from Sinaloa.

Stems stout, woody, branching, 60 to 120 cm. high, 3 cm. in diameter, the old areoles bearing 3 to 8 stout spines 3 to 5 cm. long, but on the trunk often 15 to 20 spines from an areole; first and second-year branches usually short, spineless or with 1 or 2 brown spines, those of the first year green, of the second year brownish; areoles bearing numerous small brown glochids; leaves sessile, 2 to 3 cm. long, obovate, acute, fleshy; flowers about 4 cm. in diameter; sepals few, spatulate, short; petals few, yellow, broad, entire; fruit joint-like, oblong, 4 to 5 cm. long, orange-colored, with large areoles bearing brown glochids; seeds 1 or few, covered with white deciduous hairs. "Alcajer" (Baja California).

The fruit is said to be edible but very sour.

7. **Pereskiopsis spathulata** (Otto) Britt. & Rose, Smiths. Misc. Coll. **50**: 333. 1907.

Pereskia spathulata Otto; Pfeiff. Enum. Cact. 176. 1837.

Opuntia spathulata Weber, Bull. Mus. Hist. Nat. **4**: 165. 1898.

Collected many years ago in Mexico, but without definite locality.

Branching shrub, 1 to 2 meters high; branches few, glaucescent, deflexed; leaves spatulate, thick, green, 2.5 to 5 cm. long; areoles distant, woolly, hairy when young; spines 1 or 2, rigid, white below, 2.5 cm. long; glochids brown, borne in the upper part of the areoles; flowers red; seeds white.

The vernacular name "pititache" has been reported, perhaps erroneously, for this species.

8. **Pereskiopsis pititache** (Karw.) Britt. & Rose, Smiths. Misc. Coll. **50**: 332. 1907.

Pereskia pititache Karw.; Pfeiff. Enum. Cact. 176. 1837.

Pereskia calandriniaefolia Link & Otto; Salm-Dyck, Cact. Hort. Dyck. 1849. 252. 1850.

Opuntia pititache Weber, Bull. Mus. Hist. Nat. **4**: 166. 1898.

Reported from southern Mexico.

Stems rather low and somewhat branching; bark light brownish and flaking off; areoles on main trunk each bearing 1 to 4 slender acicular spines and a small cluster of yellowish glochids; branches, even when several years old, bearing a single long acicular spine from an areole and no glochids; young branches rather slender and green, their areoles small, black in the center, with long white hairs from their margins and no spines; leaves obovate or oblong-obovate, 4 cm. long or less, pale green, thin, acute or bluntish at apex, narrowed at base.

The names "patilón" and "pititache" are reported for this species.

9. **Pereskiopsis aquosa** (Weber) Britt. & Rose, Smiths. Misc. Coll. **50**: 331. 1907.

Opuntia aquosa Weber, Bull. Mus. Hist. Nat. **4**: 165. 1898.

Vicinity of Guadalajara, Jalisco.

Shrub, with glabrous glaucous green branches, the young shoots with long white hairs at the areoles; leaves bright green, nearly elliptic, acute, about twice as long as wide, narrowed at base, glabrous; spines usually solitary, standing at right angles to the stem, white; glochids few, yellow; flowers yellow; outer petals blotched with red; fruit pear-shaped, 4 to 5 cm. long, 2 to 2.5 cm. in diameter, yellowish green. "Tuna de agua," "pitaya de agua," "chirrioncillo," "tasajillo," "alfilerillo."

3. **NOPALEA** Salm-Dyck, Cact. Hort. Dyck. 1849. 63. 1850.

Much branched plants with definite cylindric trunks; roots, so far as known, fibrous; branches or joints flattened, fleshy, often narrow; glochids usually less abundant than in *Opuntia;* spines solitary or in clusters at the areoles, sheathless; leaves small, subterete, soon deciduous; areoles bearing white wool, glochids, and often spines; flowers originating in the areoles usually at or near the edges of the joints; sepals ovate, erect; petals red or pinkish, erect, closely appressed against the numerous stamens and the style; filaments and style slender, much longer than the petals; ovary more or less tuberculate, naked or spiny, with a very deep umbilicus; fruit a juicy berry, red, edible, usually spineless; seeds numerous, flat, covered by a hard bony aril.

Joints without spines----------1. N. cochenillifera.
Joints more or less spiny.
  Spines acicular----------2. N. gaumeri.
  Spines subulate.
    Areoles usually with 1 or 2 spines, but sometimes without spines; joints glaucous----------3. N. auberi.

Areoles with 2 to 12 spines; joints green.
Joints narrow, 4 to 7 times as long as wide_____4. N. dejecta.
Joints oblong or oblong-obovate, 2 to 4 times as long as wide.
Spines 2 to 4; joints not tuberculate_____5. N. karwinskiana.
Spines 4 to 12; joints strongly tuberculate_____6. N. inaperta.

1. Nopalea cochenillifera (L.) Salm-Dyck, Cact. Hort. Dyck. 1849. 64. 1850.
Cactus cochenillifer L. Sp Pl. 468. 1753.
Opuntia cochinelifera Mill. Gard. Dict. ed. 8. *Opuntia* No. 6. 1768.
Cultivated throughout tropical America.

Often tall plants, 3 to 4 meters high, with trunks up to 20 cm. thick; branches of ascending or spreading oblong joints, sometimes 50 cm. long, green, bright green at first; spines none or rarely minute ones developing on the older joints; glochids numerous, caducous; flowers appearing from the tops of the joints, usually in great abundance; flower, from base of ovary to tip of style, 5.5 cm. long; ovary nearly globular, 2 cm. long, with low diamond-shaped tubercles, its areoles bearing many glochids; sepals broadly ovate, acute, scarlet; petals a little longer than the sepals, otherwise similar, persistent; stamens pinkish, exserted 1 to 1.5 cm. beyond the petals; stigma lobes 6 or 7, exserted beyond the stamens; style swollen just above its base into a broad disk; fruit red, about 5 cm. long; seeds about 5 mm. long and 3 mm. wide. "Nocheznopalli" (Nahuatl); "nopal de San Gabriel" (Oaxaca); "tuna mansa" (Porto Rico); "tuna," "nopal" (El Salvador).

Nopalea cochenillifera is one of the best known of Mexican plants, particularly because of the fact, as indicated by the specific name, that it was upon this cactus that there were propagated the cochineal insects from which was obtained the famous dye of the same name. The source of the dye was well known to the precolumbian inhabitants of Mexico, who used it for coloring various articles. Immediately after the Conquest the export of cochineal was begun, and it was long one of the chief articles of tribute to the crown. The industry was later established in Spain, India, Jamaica, the Canary Islands, and elsewhere. The principal producer of the dye was probably the Canaries, and from those islands in 1868 more than 6,000,000 pounds, valued at $4,000,000 was exported. With the development of coal-tar dyes this industry quickly decayed.

The cochineal insects were "planted" upon the branches of the plants, where they quickly multiplied, and were later brushed off into bags. After having been dried, they became the cochineal of commerce. Large plantations of *Nopalea* plants were made in Mexico for this purpose, the chief centers of production being in Guerrero and Oaxaca. It should be noted that the cochineal insect lives upon Opuntias, and extends as far north as the State of Colorado.

The fruit is edible. The joints are sometimes applied as poultices to relieve articular rheumatism, erysipelas, ophthalmia, earache, and toothache.

2. Nopalea gaumeri Britt. & Rose, Cactaceae 1: 216. 1919.
Yucatán; type locality, near Silam.

About 3 meters high, much branched; joints small, linear-oblong or oblong-oblanceolate, 6 to 12 cm. long, 2 to 3 cm. broad, rather thin; areoles small, 1 to 2 cm. apart; spines very unequal, 5 to 20 mm. long, acicular, 4 to 12, yellowish when young; flower small, including ovary and stamens about 4 cm. long; sepals ovate, acute; petals oblong, 12 mm. long; stamens long-exserted; style longer than the stamens; fruit red, darker within, obovoid, 3 cm. long, its numerous areoles bearing spines and yellow glochids; umbilicus prominent, 1 cm. deep; seeds about 4 mm. broad, with very narrow margin and very thin testa.

3. Nopalea auberi (Pfeiff.) Salm-Dyck, Cact. Hort. Dyck. 1849. 64. 1850.
Opuntia auberi Pfeiff. Allg. Gartenz. 8: 282. 1840.
Central to southern Mexico; type locality unknown.

Often 8 to 10 meters high, with a cylindric jointed trunk, never very spiny but the areoles bearing tufts of brown glochids; branches often at right angles to the stem; joints narrow, thick, 30 cm. long, bluish green and glaucous; areoles circular, about 2 mm. broad, bearing short white wool and later a tuft of brown glochids; spines when present 1 or 2, subulate, the upper one about twice as long as the other, white or nearly so, with brownish tips, the longest one 2 to 3 cm. long; flowers from base of ovary to tip of style about 9 cm. long; petals erect, closely embracing the stamens, rose-pink, ovate-lanceolate, acuminate, 2 to 3.5 cm. long; filaments 12 to 15 mm. longer than the petals, white below, but the exposed parts pinkish; ovary 4 cm. long, with low but very distinct tubercles and a deep umbilicus, its areoles bearing many brown glochids, these sometimes 10 mm. long.

4. Nopalea dejecta Salm-Dyck, Cact. Hort. Dyck. 1849. 64. 1850.
Opuntia dejecta Salm-Dyck, Hort. Dyck. 361. 1834.
Cultivated in tropical Mexico; type locality unknown.

Plants 1 to 2 meters high, with definite trunk, very spiny, the old areoles often bearing 6 or 8 spines; joints narrow, 10 to 15 cm. long, only moderately thick, often drooping, bright green even in age, bearing usually two somewhat spreading spines at an areole; spines at first pale yellow or pinkish, in age gray, the longest 4 cm. long; flower, including ovary and style, 5 cm. long; sepals obtuse; petals erect, dark red; stamens long-exserted, dark red. "Nopal chamacuero" (Tamaulipas).

The fruit is edible. The joints are sometimes cut into strips and boiled as a vegetable.

5. Nopalea karwinskiana (Salm-Dyck) Schum. Gesamtb. Kakt. 752. 1898.
Opuntia karwinskiana Salm-Dyck, Cact. Hort. Dyck. 1849. 239. 1850.
Widely distributed in Mexico.

A tree, 2 meters high or more, with a definite jointed terete spiny trunk; joints oblong, 15 to 30 cm. long, light dull green, only slightly glaucous; leaves elongate, acute; areoles distant; spines 3 to 7 from an areole, porrect, 1 to 2 cm. long, pale yellow to nearly white; glochids yellow, numerous, caducous; flowers red, 11 to 12 cm. long; ovary deeply umbilicate, 3 cm. long. "Nopalillo de flor" (Jalisco); "nopalillo."

The root is said to be employed as a remedy for dysentery.

6. Nopalea inaperta Schott; Griffiths, Monatsschr. Kakteenk. 23: 139. 1913.
Yucatán.

Described as 5 to 7 meters high but in cultivation much smaller, diffusely branched, often bushlike; trunk very spiny; terminal joints rather small, obovate, 6 to 17 cm. long, strongly tuberculate, bright green; spines usually 3 to 6 at areoles of young joints, more at old ones, yellowish brown, 2 cm. long or less; flowers including ovary and stamens 4 cm. long; filaments numerous, long-exserted; style much longer than the stamens; fruit red, 1.5 cm. long.

4. OPUNTIA Mill. Gard. Dict. Abr. ed. 4. 1754.

Plants sometimes with definite trunks or more often much branched from the base, the branches often spreading, reclining, or prostrate, sometimes clambering, but never climbing (one species known with annual stems); roots fibrous or rarely tuberous and large and fleshy; ultimate branches (joints or pads) cylindric to globose or flattened, usually very fleshy, sometimes woody;

areoles axillary, bearing spines, barbed bristles (glochids), hairs, flowers, and sometimes glands; leaves usually small, terete, mostly early deciduous; spines solitary or in clusters, terete or flattened, naked or sheathed; glochids usually numerous, borne above the spines; flowers usually one at an areole; ovary many-ovuled, bearing leaves, the areoles often with spines and glochids; sepals usually grading into the petals; petals usually of various shades and combinations of green, yellow, and red (rarely white), widely spreading; stamens much shorter than the petals, sensitive; fruit a berry, dry or juicy, often edible, spiny or naked, globular, ovoid, or ellipsoid; seed covered by a hard bony aril, white, flattened.

The species of *Opuntia* are common in nearly all parts of Mexico, particularly in the arid regions. Those of the subgenus *Platyopuntia* are of great economic importance because of their edible fruits. Not all species produce edible fruits, but in certain ones the fruits are large and of excellent quality. During their season the tunas are the principal food of the people in certain parts of Mexico, and enormous quantities of them are consumed. Usually they are eaten raw, but they are also cooked in various ways, and sweetmeats are made from them. *Queso de tuna* consists of the dried fruit pressed into large cakes; this is widely sold in the markets. *Miel de tuna* is a syrup prepared from the fruit. *Melcocha* is a thick paste made by boiling down the juice. *Colonche* is the boiled and fermented juice. *Nochote* or *nochocle* is a fermented beverage prepared from tuna juice, pulque, and water.[1] *Tejuino* also is a beverage prepared from the juice of the fruit.

The tender young joints are often cooked as a vegetable. They are also applied as poultices to reduce inflammation. The juice of the joints is sometimes boiled with tallow in making candles, in order to make the candles hard.

Among some of the Californian Indians the seeds were an important food. These were stored until winter, when they were ground and used to prepare a kind of atole.

Many of the Opuntias are of importance as food for stock in the arid regions. In order to make them more easily edible, the spines are sometimes burned off with torches.[2]

The usual name for a plant of the subgenus *Platyopuntia* is "nopal"; for the fruit "tuna" (a name said to be of West Indian origin). The English name is prickly pear. An infinite number of names is employed in Mexico to designate the numerous varieties of the fruit that are recognized. The following are some of the names that are reported for the plants and their fruits: "Nochtli" (fruit; Nahuatl); "culhua"; "pacac", "potzotz" (Huastec); "taat" (Mixe); "pare" (Tarascan); "câhâ" (fruit), "xâthâ" (plant) (Otomí).

The nopal occupies a prominent place in Mexican legend and history, and upon the national banner there appears an eagle perched upon a nopal plant.

The tunas are mentioned by all the early writers, as, for instance, Oviedo, who devotes a long chapter to them. Bernal Díaz del Castillo mentions them as one of the fruits depended upon for food during the siege of Mexico

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[1] For an account of the economic properties of the genus see Hare and Griffiths, The tuna as food for man, N. Mex. Agr. Expt. Sta. Bull. 64. 1907.

[2] See Griffiths and Hare, Prickly pear and other cacti as food for stock, N. Mex. Agr. Expt. Sta. Bull. 60. 1906.

in 1521. Clavigero states that improved varieties of tunas were carried to Baja California by the early missionaries. He reports also that the Cochimí name for the fruit "is the single vowel *a*."

Joints of the stems all terete, elongate or short, cylindric to globose. (Subgenus CYLINDROPUNTIA.)
Spines without sheaths——VII. CLAVATAE.
Spines with papery sheaths.
Spines, at least some of them, solitary, sometimes several; ultimate branches slender, rarely more than 1 cm. thick.——I. LEPTOCAULES.
Spines always more than one; ultimate branches stouter.
Ultimate branches not over 2 cm. thick——II. THURBERIANAE.
Ultimate branches 2 cm. thick or more.
Fruit dry——III. ECHINOCARPAE.
Fruit fleshy.
Tubercles of young joints scarcely longer than broad.
IV. BIGELOVIANAE.
Tubercles distinctly longer than broad.
Tubercles narrow, high, laterally flattened——V. IMBRICATAE.
Tubercles broad, low——VI. FULGIDAE.
Joints, at least some of them, flat or compressed. (Subgenus PLATYOPUNTIA.)
Stems annual, very slender——XXIV. CHAFFEYANAE.
Stems perennial, stout or slender.
Flowers dioecious; petals very narrow——XXIII. STENOPETALAE.
Flowers perfect; petals obovate to oblong.
Joints easily detached from the plants.
Joints very easily detached, little flattened; plants mostly low and with small joints——VIII. PUMILAE.
Joints not so easily detached, flattened; plants mostly taller and with larger joints——IX. TUNAE.
Joints not easily detached, persistent.
Areoles small, 1 to 2 mm. in diameter, mostly close together, not elevated——X. BASILARES.
Areoles larger, mostly distant.
Spines, when present, brown or yellow (white in *O. setispina*).
Spines brown, at least at base or tip.
Plants bushy or depressed.
Spines acicular——XI. SETISPINAE.
Spines subulate——XII. PHAEACANTHAE.
Plants tall, sometimes with a definite trunk.
XIII. ELATIORES.
Spines yellow, at least partially so.
Epidermis glabrous.
Areoles close together, bearing long brown wool.
XIV. SCHEERIANAE.
Areoles distant, without long wool——XV. DILLENIANAE.
Epidermis, at least that of the ovary, pubescent.
XVI. MACDOUGALIANAE.
Spines, when present, white (or faintly yellow).
Epidermis pubescent.
Spines acicular——XVII. TOMENTOSAE.
Spines setaceous, flexible——XVIII. LEUCOTRICHAE.

Epidermis glabrous.
Areoles bearing long soft hairs_____XIX. ORBICULATAE.
Areoles without long hairs.
Joints green or bluish green.
Plants spineless, or with a few, usually short spines.
XX. FICUS-INDICAE.
Plants spiny, at least on old joints.
XXI. STREPTACANTHAE.
Joints blue_____XXII. ROBUSTAE.

I. LEPTOCAULES.

Ultimate joints short, usually at right angles to the branches, 4 to 7 mm. thick.
Leaves ovoid to ovoid-subulate; young areoles long-hairy__1. O. mortolensis.
Leaves linear; areoles not long-hairy_____2. O. leptocaulis.
Ultimate joints longer, usually at an acute angle with the branches, 8 to 15 mm. thick.
Joints only slightly tuberculate_____3. O. arbuscula.
Joints manifestly tuberculate_____4. O kleiniae.

II. THURBERIANAE.

Tubercles narrowly oblong, 1 cm. long or more.
Spines, at least the larger ones, 2.5 cm. long or more_____5. O. recondita.
Spines 2 cm. long or less_____6. O. thurberi.
Tubercles low, oblong, 6 to 8 mm. long_____7. O. clavellina.

III. ECHINOCARPAE.

Sheaths of the spines white or straw-colored_____8. O. echinocarpa.
Sheaths yellow-brown_____9. O. serpentina.

IV. BIGELOVIANAE.

Larger spines numerous; upper tubercles on fruit larger than the lower ones.
10. O. bigelovii.
Larger spines 4 to 6; tubercles on fruit all alike_____11. O. ciribe.

V. IMBRICATAE.

Joints clavate; tubercles not much flattened laterally_____19. O. molesta.
Joints cylindric; tubercles much flattened laterally.
Fruit smooth or but slightly tuberculate.
Branches very stout, 5 cm. thick or more_____12. O. cholla.
Branches relatively slender, 2 cm. thick or less.
Plants glaucous; spines 4 at an areole_____13. O. calmalliana.
Plants not glaucous; spines more than 4 at an areole__14. O. versicolor.
Fruit manifestly tuberculate.
Plants tall, up to 2 to 4 meters high.
Flowers small, the petals 1.5 cm. long_____15. O. lloydii.
Flowers large, the petals 2 to 3 cm. long._____16. O. imbricata.
Plants low, 60 cm. high or less.
Flowers yellow_____17. O. tunicata.
Flowers rose-colored_____18. O. pallida.

VI. FULGIDAE.

Joints very readily detached, freely falling——20. O. fulgida.
Joints not readily detached, persistent.
  Spines brown or reddish, at least at base.
    Branches slender; fruit not proliferous——21. O. spinosior.
    Branches stout; fruit proliferous——22. O. prolifera.
  Spines white or yellow.
    Spines white; petals greenish yellow, 1 cm. long or less——23. O. alcahes.
    Spines yellow; petals red, 2 cm. long——24. O. burrageana.

VII. CLAVATAE.

Spines flattened.
  Stems very stout.
    Stems hardly clavate; ovary very prickly——25. O. invicta.
    Stems strictly clavate; ovary only slightly prickly——26. O. stanlyi.
  Stems more slender and weak——27. O. schottii.
Spines terete, elongate, and flexible, or the central ones somewhat flattened.
  Flowers pinkish or purple——28. O. vilis.
  Flowers yellow.
    Spines comparatively short, swollen at base——29. O. bulbispina.
    Spines long and flexible, not swollen at base——30. O. grahamii.

VIII. PUMILAE.

Areoles (young ones) with only 1 to 3 spines——31. O. pumila.
Areoles with 3 to 7 spines——32. O. pubescens.

IX. TUNAE.

Areoles surrounded by purplish spots——33. O. decumbens.
Areoles not surrounded by purplish spots——34. O. depressa.

X. BASILARES.

Joints not pubescent——35. O. lubrica.
Joints usually manifestly pubescent
  Spines none or few.
    Flowers red——36. O. basilaris.
    Flowers yellow to orange.
      Joints bright green.
        Glochids long——37. O. microdasys.
        Glochids short——38. O. macrocalyx.
      Joints grayish green——39. O. rufida.
  Spines very numerous.
    Areoles close together——40. O. pycnantha.
    Areoles distant.——41. O. comonduensis.

XI. SETISPINAE.

Joints elongate——42. O. megarhiza.
Joints obovate to orbicular.
  Flowers red or purple——43. O. pottsii.
  Flowers yellow.
    Areoles large; joints glaucous, purplish about areoles——44. O. setispina.
    Areoles small; joints green throughout——45. O. tenuispina.

XII. PHAEACANTHAE.

Plants small and creeping——53. O. rastrera.
Plants more or less bushy.
Joints thin; spines, when present, very long and confined to the upper and middle areoles.
Spines dark brown, stout, rigid——46. O. macrocentra.
Spines pale brown, flexible or subulate——47. O. gosseliniana.
Joints thick; spines not confined to the upper and middle areoles.
Joints relatively small, seldom over 15 cm. broad; plants relatively low.
Plants erect, 2 meters high or less——48. O. azurea.
Plants bushy, rarely over 1 meter high——49. O. phaeacantha.
Joints relatively large, mostly over 15 cm. broad; plants relatively tall.
Spines clear brown nearly throughout——50. O. occidentalis.
Spines nearly white above or throughout.
Spines with dark brown bases——51. O. engelmannii.
Spines whitish throughout——52. O. discata.

XIII. ELATIORES.

A single species in Mexico——54. O. fuliginosa.

XIV. SCHEERIANAE.

A single species——55. O. scheeri.

XV. DILLENIANAE.

Spines nearly setaceous, most of them reflexed——56. O. chlorotica.
Spines, when present, acicular to subulate.
Spines mostly stout, commonly flattened——57. O. dillenii.
Spines acicular to subulate, terete or slightly flattened at base.
Spines long.
Areoles mostly 1.5 to 2 cm. apart.——58. O. tapona.
Areoles mostly 2.5 to 4 cm. apart.
Spines yellow or yellowish brown——59. O. lindheimeri.
Spines pale yellow or whitish——60. O. cantabrigiensis.
Spines 1.5 cm. long or less, or becoming longer on old joints.
61. O. pyriformis.

XVI. MACDOUGALIANAE.

Joints merely finely puberulent or glabrous; spines 1.5 cm. long or less.
62. O. durangensis.
Joints distinctly pubescent; spines 2 to 3 cm. long.
Petals red.
Style shorter than the petals——63. O. atropes.
Style as long as the petals——64. O. affinis.
Petals yellow.
Spines acicular, at first yellow, soon white——65. O. macdougaliana.
Spines subulate.
Petals retuse; areoles of ovary many, approximate——66. O. velutina.
Petals mucronate; areoles of ovary few, distant——67. O. wilcoxii.

XVII. TOMENTOSAE.

Joints narrowly obovate——68. O. tomentosa.
Joints broadly obovate——69. O. guilanchi.

XVIII. LEUCOTRICHAE.

A single species.....70. O. leucotricha.

XIX. ORBICULATAE.

Hairs from the areoles of young plants long and white, long-peristent; plants low.....71. O. orbiculata.
Hairs from the areoles of young joints early deciduous; plants tall.
72. O. pilifera.

XX. FICUS-INDICAE.

Joints dull.
Joints thin, up to 50 cm. long.....73. O. ficus-indica.
Joints thick, 15 cm. long or less.....74. O. crassa.
Joints glossy.....75. O. undulata.

XXI. STREPTACANTHAE.

Areoles close together, sunken.....76. O. spinulifera.
Areoles not close together, not sunken.
Spines acicular.....77. O. lasiacantha.
Spines subulate.
Areoles with 2 or more short reflexed hairs or bristles at the lower part of the areole.
Spines strongly depressed; areoles with several hairs.
78. O. hyptiacantha.
Spines not strongly depressed; areoles with 1 or 2 hairs.
Joints obovate.....79. O. streptacantha.
Joints oblong.....80. O. amyclaea.
Areoles without reflexed hairs or bristles.....81. O. megacantha.

XXII. ROBUSTAE.

Fruit deep red, 7 to 9 cm. in diameter.....82. O. robusta.
Fruit greenish white, 4 to 5 cm. in diameter.....83. O. guerrana.

XXIII. STENOPETALAE.

Spines dark; plants low, prostrate.....84. O. stenopetala.
Spines white; plants erect.
Joints narrow; spines acicular.....85. O. glaucescens.
Joints broader; spines stouter.....86. O. grandis.

XXIV. CHAFFEYANAE.

A single species.....87. O. chaffeyi.

1. Opuntia mortolensis Britt. & Rose, Cactaceae 1: 47. 1919.

Sonora; described from cultivated plants.

Slender, 60 cm. high or less, dull green, the ultimate twigs short, sometimes only 2 cm. long, 4 to 5 mm. thick, scarcely tuberculate; young areoles with numerous early deciduous weak white hairs and several brown glochids; areoles of old branches with solitary acicular spines 3 to 5 cm. long, these with tightly fitting brown sheaths.

2. Opuntia leptocaulis DC. Mém. Mus. Hist. Nat. **17**: 118. 1828.

Opuntia ramulifera Salm-Dyck, Hort. Dyck. 360. 1834.

Opuntia gracilis Pfeiff. Enum. Cact. 172. 1837.

Opuntia virgata Link & Otto; Först. Handb. Cact. 506. 1846.

Opuntia vaginata Engelm. in Wisliz. Mem. North. Mex. 100. 1848.

Opuntia frutescens Engelm. Bost. Journ. Nat. Hist. **6**: 208. 1850.

Widely distributed in Mexico, extending southward to Puebla. Also in the southwestern United States.

Usually bushy, often compact, 2 meters high or less, but sometimes with a short definite trunk 5 to 8 cm. in diameter, dull green with darker blotches below the areoles, with slender, cylindric, ascending, hardly tuberculate branches; branches, especially the fruiting ones, thickly set with short, usually spineless joints spreading nearly at right angles to the main branches, very easily detached; spines usually solitary at young areoles, very slender, white, at areoles of old branches 2 or 3 together, 2 to 5 cm. long or less; areoles with very short white wool; flowers greenish or yellowish, 1.5 to 2 cm. long (including the ovary); ovary obconic, bearing numerous small woolly brown areoles subtended by small leaves, its glochids brown; fruit globular to obovate or even clavate, often proliferous, red or rarely yellow, 10 to 18 mm. long, slightly fleshy. "Tasajillo" (Durango, Nuevo León, Tamaulipas, Chihuahua, Texas, New Mexico).

The plant is abundant in many parts of northern Mexico and often forms dense thickets. The long spines are very offensive, and often cause bad sores when they penetrate the flesh.

Opuntia ramosissima Engelm.,[1] a closely related species, common in southwestern Arizona, should be looked for in Sonora and Baja California.

Opuntia tesajo Engelm.[2] was based on a Baja California specimen, but the type has been lost, and the plant should perhaps be referred to *O. leptocaulis*.

3. Opuntia arbuscula Engelm. Proc. Amer. Acad. **3**: 309. 1856.

Sonora. Southwestern United States; type from the lower Gila, near Maricopa Village.

Forming a bush 2 to 3 meters high, often with a rounded, very compact top with numerous short branches; trunk short, 10 to 12 cm. in diameter, with several woody branches; ultimate joints 5 to 7.5 cm. long, 8 mm. in diameter, with low indistinct tubercles; spines usually 1, but sometimes several, especially on old joints, porrect, up to 4 cm. long, covered with loose straw-colored sheaths; flowers greenish yellow tinged with red, 3.5 cm. long; fruit often proliferous, sometimes only one-seeded.

4. Opuntia kleiniae DC. Mém. Mus. Hist. Nat. **17**: 118. 1828.

Opuntia wrightii Engelm. Proc. Amer. Acad. **3**: 308. 1856.

Opuntia caerulescens Griffiths, Rep. Mo. Bot. Gard. **20**: 86. 1909.

Central and northern Mexico. Southwestern United States.

Stems pale, glaucous, sometimes 2.5 meters tall, woody at base; tubercles long; areoles large, a little longer than wide, filled with white wool from the very first; spines usually 1, but sometimes more, from the base of the areole, covered with yellow sheaths, on old joints accompanied by several bristle-like spines from the lower margin of the areole; glochids yellow to brown; flowers 3 cm. long, purplish; petals broad, rounded at apex; fruit red, 2 to 2.5 long, long persisting; seeds 4 to 5 mm. broad. "Tasajillo" (Durango, *Patoni*).

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[1] Amer. Journ. Sci. II. **14**: 339. 1852.

[2] Coulter, Contr. U. S. Nat. Herb. **3**: 448. 1896.

5. Opuntia recondita Griffiths, Monatsschr. Kakteenk. 23: 131. 1913.

Type from La Perla, Mexico.

Shrub 1 to 1.5 meters high; joints 20 to 30 cm. long, very spiny, about 2 cm. in diameter, tuberculate; areoles broadly obovate, 5 to 6 mm. long, in age larger and more prominent, forming new wool for several years; glochids yellow; spines at first 2 to 4, later 6 to 10, 2.5 to 5 cm. long, gray at base, deep reddish brown at tip, with a loose sheath; flowers bright purple, 2.5 cm. broad; fruit persistent, 3 to 3.5 cm. long, greenish yellow, weakly tuberculate.

6. Opuntia thurberi Engelm. Proc. Amer. Acad. 3: 308. 1856.

Sonora and Sinaloa; type from Bacuachi, Sonora. Arizona.

Large bushy plants, 2 to 4 meters high; joints slender, elongate, 15 to 25 cm. long, 10 to 12 mm. in diameter; tubercles 1.5 to 2 cm. long, flattened laterally; spines 3 to 5, short (10 to 12 mm. long), spreading, covered with thin brown papery sheaths, the lowest one stoutest; flowers 3.5 cm. broad, brownish; fruit 2 to 3 cm. long, spineless; seeds nearly globular, 4 mm. in diameter. "Cholla" (Sinaloa).

7. Opuntia clavellina Engelm.; Coulter, Contr. U. S. Nat. Herb. 3: 444. 1896.

Central Baja California; type collected near Misión Purísima.

Plants 1 meter high, rather openly branched; ultimate joints slender, spreading or ascending, somewhat clavate, 5 to 10 cm. long, a little over 1 cm. in diameter; tubercles prominent, elongate; spines 3 to 6 in a cluster, very long, covered with loose, straw-colored or brown sheaths, the central one much longer and porrect; flowers yellow; fruit clavate, short, tuberculate.

For an illustration of this species see Contr. U. S. Nat. Herb. 16: *pl. 129, A.*

8. Opuntia echinocarpa Engelm. & Bigel. Proc. Amer. Acad. 3: 305. 1856.

Baja California. Southwestern United States; type from the Colorado Valley near the mouth of the Bill Williams River.

Plants usually low, but sometimes 1.5 meters high, much branched and widely spreading, with a short woody trunk 2 to 3 cm. in diameter, in age with nearly smooth bark; joints short, turgid, strongly tuberculate; spines numerous, when young bright yellow, when older brownish or in age grayish, unequally covered with thin papery sheaths; flowers yellowish, but the sepals often tipped with red; ovary short, turbinate, densely spiny, especially in the upper part; fruit dry, very spiny; seeds somewhat angular, 4 mm. broad.

Opuntia acanthocarpa Engelm. & Bigel.,[1] a somewhat smaller species, has been reported from Mexico, but we have seen no specimens.

9. Opuntia serpentina Engelm. Amer. Journ. Sci. II. 14: 338. 1852.

Northern Baja California. Southern California, the type from San Diego.

Ascending, erect, or prostrate; branches slender, 2 to 2.5 cm. in diameter, bluish green, strongly tuberculate; tubercles elevated, 1 to 1.5 cm. long, longer than broad, flattened; spines 7 to 20, brown, covered with yellowish brown, papery sheaths about 1 cm. long; glochids light brown; flowers close together at the top of short branches, about 4 cm. broad, greenish yellow, the outer petals tinged with red; ovary strongly tuberculate, spiny, with a depressed umbilicus; fruit dry, very spiny.

10. Opuntia bigelovii Engelm. Proc. Amer. Acad. 3: 307. 1856.

Northern Sonora and northern Baja California. Southwestern United States; type from the region of Bill Williams River.

Usually with a central erect trunk, 1 meter high or less, with short lateral branches, the upper ones erect; joints usually 5 to 15 cm. long, very turgid,

[1] Proc. Amer. Acad. 3: 308. 1856.

with closely set areoles and almost impenetrable armament; tubercles slightly elevated, pale green, somewhat 4-sided, about as long as broad, 1 cm. broad or less; spines, as well as their papery sheaths, pale yellow; flowers several, borne at the tips of the branches, 4 cm. long (including the ovary); sepals orbicular, about 1 cm. in diameter, tinged with red; petals 1.5 cm. long, pale magenta to crimson; ovary 2 cm. long, its large areoles bearing brown wool and several acicular spines; fruit usually naked, strongly tuberculate, the upper tubercles larger than the lower.

For an illustration of this species see Contr. U. S. Nat. Herb. 16: *pl. 128, B.*

11. **Opuntia ciribe** Engelm.; Coulter, Contr. U. S. Nat. Herb. 3: 445. 1896.

Central Baja California.

One meter high or less, with numerous stout branches, densely armed; ultimate joints 4 to 5 cm. in diameter, strongly and regularly tuberculate, 3 cm. in diameter; tubercles about as long as broad (5 to 7 cm. broad); larger spines 4 to 6, stout, 2 to 3 cm. long, covered with loose yellow sheaths, accompanied by several bristle-like spines or hairs; glochids numerous; flowers yellow; ovary somewhat bristly; fruit strongly tuberculate, 3 to 4 cm. long, spineless.

12. **Opuntia cholla** Weber, Bull. Mus. Hist. Nat. 1: 320. 1895.

Widely distributed in Baja California.

Usually treelike, 1 to 3 meters high, with a definite trunk 7 to 15 cm. in diameter; trunk very spiny at first and becoming more spiny each year for some time, but in age spineless and developing a smooth, brownish yellow bark; top of plant often dense and broad; joints often in whorls, horizontal, pale, with large compressed tubercles; spines usually numerous, more or less porrect, covered with loose brownish sheaths; glochids numerous, yellow; flowers rather small, 3 cm. broad, deep purple; fruit often 4 to 5 cm. long, usually proliferous, often in long chains of 8 to 12 individuals or forming compound clusters; seeds numerous, very small, often abortive. "Cholla."

In this as in some other species the fruits are proliferous, hanging on for a few years and usually remaining green. They are, however, easily detached, and on falling to the ground take root and form new colonies. For an illustration of *O. cholla* see Contr. U. S. Nat. Herb. 16: *pl. 128, A.*

13. **Opuntia calmalliana** Coulter, Contr. U. S. Nat. Herb. 3: 453. 1896.

Baja California, the type from Calmallí.

Habit and height unknown; joints cylindric, 1 to 2 cm. in diameter, glaucous, with linear-oblong crested (mostly distinct) tubercles 20 to 25 mm. long; pulvini densely covered with yellowish wool, and with a penicillate tuft of whitish bristles at upper edge; spines usually 4, the upper one stout and porrect, reddish with yellowish tip, 2 to 2.5 cm. long (occasionally 1 to 2 short upper ones added), the usually 3 (sometimes 4) lower ones more slender and sharply deflexed, 1 to 1.5 cm. long (occasionally one of them longer); flowers apparently purple; ovary covered with very prominent woolly pulvini, ripening into a smooth juicy obovate fruit; seeds discoid and beaked, irregularly angular, with broad commissure, about 4 mm. broad.

14. **Opuntia versicolor** Engelm.; Coulter, Contr. U. S. Nat. Herb. 3: 452. 1896.

Sonora. Arizona, the type from Tucson.

Bushy or treelike, 2 to 4 meters high, with a large open top sometimes 5 meters broad; trunk and larger stems woody throughout; terminal joints 10 to 20 cm. long, 2.5 cm. in diameter, variously colored, not strongly tuberculate when living; tubercles 1.5 cm. long; spines 5 to 11, 5 to 25 mm. long, dark-colored, with close-fitting sheaths; glochids reddish brown; flowers variously

colored, yellow, greenish, reddish, or brown, 3 to 5.5 cm. broad; ovary tuberculate, with large areoles bearing wool, glochids, and long deciduous bristles; fruit persisting for months, sometimes for a year, 2.5 to 4 cm. long, at first somewhat tuberculate, becoming pear-shaped or globose, sometimes proliferous; seeds white, 5 mm. broad.

The fruit of this species was eaten by the Pima Indians of Arizona, either raw or prepared like that of *O. imbricata.*

15. **Opuntia lloydii** Rose, Contr. U. S. Nat. Herb. **12**: 292. 1909.

Central Mexico; type from Hacienda de Cedros, Zacatecas.

Much branched, 2 to 3 meters high and nearly as broad; joints terete, 2 cm. in diameter; tubercles prominent, oblong; spines few, on last year's joints 3, reddish, 1.5 cm. long; flowers 3 cm. long, opening after midday; petals 15 mm. long, dull purple; filaments olive-green below, purplish above; style rose-colored; ovary yellowish, strongly tuberculate, naked; fruit 3 cm. long, yellow to orange, slightly tuberculate.

16. **Opuntia imbricata** (Haw.) DC. Prodr. **3**: 471. 1828.

Cereus imbricatus Haw. Rev. Pl. Succ. 70. 1828.
Opuntia rosea DC. Prodr. **3**: 471. 1828.
Opuntia decipiens DC. Mém. Mus. Hist. Nat. **17**: 118. 1828.
Opuntia exuviata DC. Mém. Mus. Hist. Nat. **17**: 118. 1828.
Opuntia arborescens Engelm. in Wisliz. Mem. North. Mex. 90. 1848.
Opuntia magna Griffiths, Proc. Biol. Soc. Washington **27**: 23. 1914.
Opuntia spinotecta Griffiths, Proc. Biol. Soc. Washington **27**: 24. 1914.

Central and northern Mexico. Southwestern United States.

Treelike, often 3 meters high or larger, with a more or less definite woody trunk 25 cm. in diameter; ultimate joints 2 to 3 cm. in diameter, strongly tuberculate; tubercles 2 to 2.5 cm. long, flattened laterally; spines 8 to 30, 2 to 3 cm. long, brown, covered with papery sheaths; flowers borne at ends of branches, 4 to 6 cm. long, sometimes 8 to 9 cm. broad, purple; ovary tuberculate, bearing a few bristles from some of the upper areoles; fruit naked, yellow, 2.5 to 3 cm. long, strongly tuberculate or, when long persistent, smooth; seeds 2.5 to 3.5 mm. in diameter. "Xoconochtli" (*Hernández*); "xoconostle," "joconoxtle" (Jalisco); "joconostle" (Zacatecas); "cardenche" (Durango, Zacatecas); "tasajo" (Chihuahua); "coyonostle" (Nuevo León, Coahuila); "coyonoxtle" (*Ochoterena*); "coyonostli" (Nuevo León); "tuna joconoxtla" (Jalisco); "tuna huell" (*Griffiths*); "velas de coyote," "entraña" (New Mexico).

In many parts of its range this is an abundant and characteristic plant, often forming extensive thickets. In early times a decoction of the fruit was used to set cochineal dye, and it is said to be so employed even at the present time. The stems contain a hard woody framework resembling a network after the soft tissue has been removed, and they are often made into canes. Among the Penitentes, a religious organization of the Southwest, it was formerly the custom, among other similar practices, during Holy Week to march in processions with large bundles of the very spiny stems bound upon their naked backs.

The Pimas of Arizona formerly consumed quantities of the hard fruits of a related species. These were cooked over night in pits filled with heated stones, then dried in the sun, after which the spines were removed, and the fruit stored for later use. Thus prepared, the fruit was boiled and salted and eaten with pinole, or it was cooked with meat or various herbs.

Opuntia cardenche Griffiths[1] is perhaps a synonym of this species, or possibly referable to *O. kleiniae.*

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[1] Rep. Mo. Bot. Gard. **19**: 259. *pl. 21.* 1908.

17. Opuntia tunicata (Lehm.) Link & Otto; Pfeiff. Enum. Cact. 170. 1837.
Cactus tunicatus Lehm. Ind. Sem. Hort. Hamb. 6. 1827.
Opuntia stapeliae DC. Mém. Mus. Hist. Nat. **17**: 117. 1828.
Opuntia perrita Griffiths, Rep. Mo. Bot. Gard. **22**: 33. 1912.
Widely distributed in Central Mexico. Ecuador, Peru, and Chile.

Very variable, sometimes low and spreading from the base and forming broad clumps, at other times 50 to 60 cm. high, with a more or less definite woody stem and numerous lateral branches; joints easily detached, sometimes short and nearly globular to narrowly oblong, 10 to 15 cm. long; spines reddish, normally 6 to 10, 4 to 5 cm. long, covered with thin white papery sheaths; flowers 3 cm. long, yellow; petals obtuse; ovary often bearing long spines at the areoles, but usually naked. "Abrojo" (Mexico); "clavellina" (Durango); "tencholote" (*Ochoterena*).

18. Opuntia pallida Rose, Smiths. Misc. Coll. **50**: 507. 1908.
Hildalgo; type from Tula.

Stems 5 cm. in diameter, about 1 meter high, with widely spreading branches, the whole plant often broader than high; old areoles very spiny, often bearing 20 spines or more, often 3 to 4 cm. long, with white papery sheaths; young areoles bearing few spines; ovary tuberculate, the areoles either naked or bearing a few bristly spines; flowers pale rose-colored; petals 15 mm. long.

19. Opuntia molesta T. S. Brandeg. Proc. Calif. Acad. II. **2**: 164. 1889.
Baja California, the type from San Ignacio.

Stems 1 to 2 meters high, with few long spreading branches; joints clavate to subcylindric, 10 to 40 cm. long, sometimes as much as 4 cm. in diameter at the top, pale green, with low broad tubercles, these elongate and often 4 cm. long or more; spines 6 to 10, unequal, the longest 2.5 to 5 cm. long, straw-colored, with loose papery sheaths; flowers purple, 5 cm. in diameter; fruit ovoid, 2.5 cm. long, somewhat spiny or naked; seeds 6 mm. in diameter, irregular in shape.

20. Opuntia fulgida Engelm. Proc. Amer. Acad. **3**: 306. 1856.
Opuntia mamillata Schott; Engelm. Proc. Amer. Acad. **3**: 308. 1856.
Sinaloa and Sonora; type from western Sonora. Arizona.

Plants sometimes 3 meters high or even larger, with a rather definite woody trunk 10 to 20 cm. in diameter, much branched, sometimes almost from the base and forming a compact flattened crown; terminal joints 10 to 20 cm. long, 3 to 5 cm. in diameter, very succulent, strongly tuberculate, easily breaking off; spines 2 to 12, yellowish to brown, 2.5 to 3.5 cm. long, acicular, covered with loose papery sheaths; glochids small, whitish to light yellow; flowers light rose, 2.5 to 3 cm. broad; fruit at first tuberculate, in age smooth, somewhat pear-shaped, 2 to 5 cm. long, green, usually very proliferous; seeds rather small, 4 mm. broad, often wanting. "Velas de coyote" (*Coulter*).

21. Opuntia spinosior (Engelm.) Toumey, Bot. Gaz. **25**: 119. 1898.
Opuntia whipplei spinosior Engelm. Proc. Amer. Acad. **3**: 307. 1856.
Sonora. New Mexico and Arizona.

Plants 2 to 4 meters high, treelike, with a more or less definite woody trunk. openly branched; ultimate joints 10 to 30 cm. long, 1.5 to 2.5 cm. in diameter, often bright purple, strongly tuberculate; tubercles about 6 to 12 mm. long, longer than broad, more or less flattened laterally; spines 6 to 12, but on old branches sometimes as many as 25, 10 to 15 mm. long, divergent, gray to brownish, covered with thin sheaths; glochids yellowish white; flowers 5 to 6 cm.

broad, purple to pink, yellow, or even white; petals about 10, broad at apex, narrowed at base; ovary tuberculate, bearing small purple leaves and long, white, easily detached bristles; fruit strongly tuberculate, spineless, yellow, globose to broadly oblong, 2.5 to 4 cm. long, with a depressed umbilicus; seeds white, 4 mm. broad, smooth, with a very indistinct marginal band.

22. Opuntia prolifera Engelm. Amer. Journ. Sci. II. 14: 338. 1852.

Widely distributed in Baja California. Southern California, the type from San Diego.

Stems 1 to 2 meters high, the trunk and old branches terete and woody; terminal joints 3 to 12 cm. long, easily breaking off, fleshy, covered with short, more or less turgid tubercles; spines 6 to 12, brown, 10 to 12 mm. long; glochids pale; flowers small; sepals orbicular, obtuse, dark red; petals red; ovary 1 cm. long, strongly tuberculate, the upper areoles bearing 2 to 6 reddish spines, or the joints naked throughout; fruit proliferous, 3 to 3.5 cm. long, often without seeds.

23. Opuntia alcahes Weber, Bull. Mus. Hist. Nat. 1: 321. 1895.

Baja California.

Plants about 1 meter high, much branched, very spiny, especially when old; branches terete; spines on young joints about 12, short, covered with white or very pale sheaths; tubercles prominent, diamond-shaped; sepals small, brownish, closely imbricate, hardly spreading at tips; petals sometimes wanting, if present about 1 cm. long, greenish yellow, obtuse; fruit globular, small, becoming turgid in age, yellowish, more or less proliferous, the umbilicus truncate or slightly depressed.

24. Opuntia burrageana Britt. & Rose, Cactaceae 1: 70. 1919.

Baja California, the type from Pichilinque Island.

Usually low and bushy, rarely 1 meter high; stems slender, 1 to 2 cm. in diameter, densely spiny; young joints cylindric to narrow-clavate, 15 cm. long or less; areoles closely set; tubercles rather low, not much broader than long; spines numerous, similar, spreading, rarely 2 cm. long, all covered with thin, bright yellow sheaths; wool in areoles short, brown; glochids, when present, short, light yellow; flower 3 to 4 cm. broad; petals few, brownish red with green base; ovary very spiny; fruit not proliferous, globular, 2 cm. in diameter, somewhat tuberculate, probably dry; seeds pale, 4 mm. in diameter.

25. Opuntia invicta T. S. Brandeg. Proc. Calif. Acad. II. 2: 163. 1889.

Central Baja California; type from San Juanico.

Plants usually growing in large clusters 2 meters in diameter and 20 to 50 cm. high, with many ascending or spreading branches; joints obovoid to clavate, dark green, 8 to 10 cm. long, strongly tuberculate; tubercles large, flattened laterally, 3 to 4 cm. long; areoles large, 1 to 1.5 cm. in diameter; spines very formidable. when young reddish or purple with carmine-red bases, chestnut-brown at tips and grayish between, in age dull; radial spines 6 to 10; central spines 10 to 12, much stouter than the radials, strongly flattened, the wool white; glochids few, white, 2 to 4 mm. long; flowers yellow, 5 cm. in diameter; sepals ovate, acuminate; ovary 2 cm. in diameter, almost hidden by the numerous reddish acicular spines; seeds yellowish, 2 mm. broad.

26. Opuntia stanlyi Engelm. in Emory, Mil. Reconn. 158. 1848.

Opuntia emoryi Engelm. Proc. Amer. Acad. 3: 303. 1856.

Opuntia kunzei Rose, Smiths. Misc. Coll. 50: 505. 1908.

Northern Sonora. Arizona and New Mexico.

Stems low, usually less than 30 cm. high, much branched, creeping, forming broad impenetrable masses 2 to 3 meters in diameter; joints 10 to 15 cm. long, clavate, more or less curved, strongly tuberculate; tubercles 3 to 4 cm. long, flattened laterally, 4 to 6 cm. apart; spines numerous, stout, elongate, somewhat roughened, reddish brown, the larger ones strongly flattened, 3.5 to 6 cm. long; flowers yellow, 5 to 6 cm. broad; fruit ovate, clavate at base, yellow, 5 to 6 cm. long, very spiny, with a depressed umbilicus; seeds flattened, 4.5 to 6.5 mm. in diameter.

27. **Opuntia schottii** Engelm. Proc. Amer. Acad. 3: 304. 1856.

Northern Mexico. Texas.

Prostrate, rooting from the areoles, forming dense clusters sometimes 2 or 3 meters in diameter; joints clavate, curved, ascending, easily breaking off, 6 to 7 cm. long, 2 cm. in diameter at thickest part, strongly tuberculate; areoles 1 to 1.5 cm. apart; spines white and sheathed when young, soon brown, the larger ones sometimes as many as 12, very slender, sometimes 6 cm. long, somewhat flattened; wool white when young, turning brown; glochids white when young, turning brown, 4 mm. long or less; flowers yellow, 4 cm. long (including ovary); sepals narrow, acuminate; petals acuminate; fruit yellow, narrowly oblong, a little narrowed at base, 4 cm. long, closely set with areoles bearing numerous short spines, bristles, and white wool, the umbilicus depressed; seeds yellow, flattened, 4 mm. in diameter, notched at base.

28. **Opuntia vilis** Rose, Contr. U. S. Nat. Herb. 12: 293. 1909.

Zacatecas.

Low, creeping, often forming mats several meters in diameter and only 10 to 15 cm. high; joints prostrate, becoming erect or ascending, the ultimate vertical ones clavate, 5 cm. long, the others 2 to 4 cm. long, very turgid, pale green, with low tubercles; young areoles bearing white wool; radial spines upward of 12, the number increasing with age by the addition of very small whitish ones; central spines on prostrate joints 4, reddish, white-tipped, 1 to 4 cm. long, terete, slightly scabrous, with a sheath 5 mm. long, those of clavate joints white, reddish on the upper surface at base; flower 4 cm. long; petals brilliant purplish, 2 cm. long; fruit pale green, 2 to 2.5 cm. in diameter, 2.5 to 3 cm. long, tuberculate, especially about the margin of the umbilicus, spiny, somewhat dry, with large white seeds.

29. **Opuntia bulbispina** Engelm. Proc. Amer. Acad. 3: 304. 1856.

Coahuila and Durango; type from Perros Bravos, north of Saltillo.

Stems low, forming wide-spreading clumps 0.6 to 1.2 meters broad; joints ovoid, 2 to 2.5 cm. long, 10 to 12 mm. in diameter; tubercles prominent, 6 to 8 mm. long; radial spines 8 to 12, acicular, 3 to 6 mm. long; central spines 4, much stouter than the radials, 8 to 12 mm. long, bulbose at base; flower and fruit unknown.

30. **Opuntia grahamii** Engelm. Proc. Amer. Acad. 3: 304. 1856.

Chihuahua. Texas and New Mexico; type from El Paso.

Roots at first thick and fleshy, becoming woody, 2 cm. thick or more; plants low, much branched, spreading, forming low mounds often half buried in sand, sometimes giving off roots at the areoles; terminal joints erect, clavate, bright green, 3 to 5 cm. long, with large oblong tubercles; areoles about 3 mm. broad; wool white; spines 8 to 15, slender, slightly scabrous, terete or some of the larger ones slightly compressed, white when young, soon reddish, the longest 3.5

to 6 cm. long; glochids numerous, slender, 4 mm. long or less, white, turning brown, persistent on the old stems; flowers yellow, 5 cm. broad; fruit oblong to ovoid, 3 to 4.5 cm. long, its numerous areoles bearing white glochids and some slender spines; seeds beakless, 5 to 5.5 mm. in diameter.

31. **Opuntia pumila** Rose, Smiths. Misc. Coll. **50**: 521. 1908.

Central and southern Mexico; type from Oaxaca.

Stems low, very much branched, the joints readily falling off when touched, 6 to 20 cm. long, velvety-pubescent, terete or sometimes slightly flattened, turgid, bearing more or less prominent tubercles; areoles small, those of old stems bearing several slender spines, the longer ones 3 cm. long; areoles of young joints usually bearing 2 yellowish spines; ovary pubescent, with few spines or none; petals yellow, tinged with red, 15 mm. long; fruit globular, red, 15 mm. long. "Cardo," "nopal cardoso" (Oaxaca, *Reko*); "vixivixio" (Zapotec, *Reko*).

32. **Opuntia pubescens** Wendl.; Pfeiff. Enum. Cact. 149. 1837.

Opuntia angusta Meinsh. Wochenschr. Gärtn. Pflanz. **1**: 30. 1858.

Opuntia leptarthra Weber; Goss. Bull. Mus. Hist. Nat. **10**: 393. 1904.

Widely distributed in Mexico. Guatemala.

Plants small, usually low, sometimes 40 cm. high, much branched; joints easily becoming detached, nearly terete, glabrous or pubescent, 3 to 7 cm. long; spines numerous, short, brownish; flowers lemon-yellow but drying red; fruit 2 to 2.5 cm. long, red, a little spiny, with depressed umbilicus; seeds 3 mm. in diameter.

33. **Opuntia decumbens** Salm-Dyck, Hort. Dyck. 361. 1834.

Opuntia puberula Pfeiff. Enum. Cact. 156. 1837.

Southern Mexico. Guatemala.

Stems low, often creeping or trailing, rarely over 40 cm. high; joints 10 to 20 cm. long, oval to oblong, covered with a short soft pubescence; areoles usually small, surrounded by a purple blotch, bearing yellow glochids and wool, the wool cobweb-like on very young joints; spines often wanting, usually solitary but sometimes numerous, slender or rather stout, 4 cm. long, yellow; flowers numerous, small, including the ovary about 4 cm. long; petals dark yellow; fruit deep purple, very juicy; seeds about 4 mm. broad.

34. **Opuntia depressa** Rose, Smiths. Misc. Coll. **50**: 517. 1908.

Southern Mexico; type from Tehuacán.

Low, creeping or spreading plant, sometimes 60 cm. high and forming a patch 3 to 4 meters in diameter; joints dark glossy yellowish green, pubescent when young, obovate, 20 cm. long, usually with 1 long, somewhat curved spine at each areole, sometimes with 1 to 3 shorter ones, all yellowish; old joints oblong, 30 cm. long, bearing 4 to 6 spines at each areole; flowers red; fruit small, globular, with large clusters of brown glochids, when immature with a broad deep umbilicus.

35. **Opuntia lubrica** Griffiths, Rep. Mo. Bot. Gard. **21**: 169. 1910.

Type from Alonzo.

Plants low, ascending-spreading, frequently 45 cm. high; joints subcircular to obovate, 15 to 20 cm. long, glossy, bright green, papillate but scarcely pubescent; areoles 15 to 22 mm. apart, 4 to 6 mm. in diameter; spines very variable, nearly absent or abundant, usually 1 to 3, mostly about 12 mm. long but sometimes 2.5 cm., yellowish, sometimes darker at base; fruit light red, acid; seeds thin-shelled, about 3 mm. in diameter.

36. **Opuntia basilaris** Engelm. & Bigel. Proc. Amer. Acad. 3: 298. 1856.

Northern Sonora. Southwestern United States.

Stems low, growing in clumps, either prostrate or erect, sometimes 1.2 meters high; joints broadly obovate, 8 to 20 cm. long, slightly pubescent or glabrous, usually highly colored; areoles numerous, filled with white to brown wool and brownish glochids; spines none or rarely a few at upper areoles; flowers 6 to 8 cm. long, deep purple or sometimes white; fruit dry, globular to obovoid; seeds thick, 6 to 10 mm. broad.

The young fruit was eaten by the Coahuilla Indians of California after having been cooked for about 12 hours in a pit lined with hot stones. The Panamint Indians gathered the young joints in May and June, brushed off the spines with bunches of grass, and dried them in the sun. The dried joints were later boiled with salt and eaten. The tender joints were also cooked in pits lined with stones, and were eaten immediately or dried and stored for use in winter.

37. **Opuntia microdasys** (Lehm.) Pfeiff. Enum. Cact. 154. 1837.

Cactus microdasys Lehm. Ind. Sem. Hamb. 16. 1827.

Opuntia pulvinata DC. Mém. Mus. Hist. Nat. **17**: 119. 1828.

Northern Mexico.

Often low and creeping but sometimes nearly erect and 40 to 60 cm. high; joints oblong to orbicular, 10 to 15 cm. long, soft-velvety, usually pale green, spineless; areoles conspicuous, closely set, filled with numerous yellow or brown glochids; flowers usually produced in abundance, 4 to 5 cm. long, pure yellow, or tinged with red; petals broad, retuse; fruit dark red, juicy, nearly globular; seeds 2 to 3 mm. broad. "Cegador" (Zacatecas); "nopal cegador" (Durango); "nopalillo cegador" (Nuevo León).

The name "cegador" ("blinding") is given because of the fact that the very numerous glochids get into the eyes of pasturing animals and sometimes cause blindness.

38. **Opuntia macrocalyx** Griffiths, Rep. Mo. Bot. Gard. **19**: 268. 1908.

Described from cultivated plants; perhaps in Coahuila.

Plants ascending or erect, about 1 meter high; joints long-obovate, commonly about 22 cm. long, gray-green, pubescent; areoles 2 to 3 mm. in diameter, 1 cm. apart; wool tawny; glochids reddish brown, 1 mm. long; spines none; flowers yellow; fruit red, the pulp greenish, long-obovoid to cylindric, about 7 cm. long; seeds few, 3 mm. in diameter.

39. **Opuntia rufida** Engelm. Proc. Amer. Acad. 3: 298. 1856.

Northern Mexico. Texas.

More or less erect, 20 to 150 cm. high, with a somewhat definite trunk; joints nearly orbicular, 6 to 25 cm. in diameter, thickish, velvety-tomentose, dull grayish green; areoles large, filled with numerous brown glochids; flowers yellow to orange, 4 to 5 cm. long (including the ovary); petals obovate, 2 to 2.5 cm. long; ovary globular, 1.5 cm. in diameter, umbilicate, with large areoles; fruit bright red. "Nopal cegador" (*Ochoterena*).

40. **Opuntia pycnantha** Engelm.; Coulter, Contr. U. S. Nat. Herb. 3: 423. 1896.

Baja California; type from Magdalena Bay.

Often low and creeping but sometimes forming a clump 20 cm. high; joints oblong to orbicular, often 20 cm. long, puberulent or papillose, usually nearly hidden by the thick mass of spines; areoles large and closely set, the upper part filled with yellow or brown glochids and the lower part with 8 to 12 yellow or brown, reflexed spines 2 to 3 cm. long; fruit 4 cm. long, very spiny; seeds 2 cm. broad, very thick.

41. **Opuntia comonduensis** (Coulter) Britt. & Rose, Smiths. Misc. Coll. **50**: 519. 1908.

Opuntia angustata comonduensis Coulter, Contr. U. S. Nat. Herb. 3: 425. 1896.

Baja California; type from Comondú.

Low spreading plants, sometimes 20 cm. high and forming broad clumps; joints obovate to orbicular, 12 to 15 cm. long, softly pubescent; areoles large, filled with brown wool and yellow glochids; lower areoles spineless, the upper ones bearing 1 or 2, rarely 3, or on old stems as many as 10, slender spines, 3 to 5 cm. long or longer, yellow; flowers (including ovary) 6 cm. long, yellow; fruit purple, 4 cm. long, spineless; seeds 4 to 4.5 mm. broad, thick.

42. **Opuntia megarhiza** Rose, Contr. U. S. Nat. Herb. **10**: 126. 1906.

San Luis Potosí; type from Alvárez.

Roots long and thickened, sometimes 30 to 60 cm. long and 5 to 6 cm. in diameter; stems 20 to 30 cm. high, much branched; lower joints elongate, 20 to 30 cm. long, cuneate below, thin, 3 cm. broad; lateral joints appearing along the margins of the older joints and often, if not always, in the same plane; spines 2 to 4, acicular, 1 to 2.5 cm. long, brown; flowers lemon-yellow, often tinged with rose, 5 cm. broad; petals about 13, obovate, mucronately tipped; ovary clavate, 3 cm. long.

Palmer reports that the fleshy roots are applied as poultices for the reduction of fractures and inflammation.

43. **Opuntia pottsii** Salm-Dyck, Cact. Hort. Dyck. 1849. 236. 1850.

Chihuahua. Texas and New Mexico.

Low spreading plant, 30 cm. high or less, from thickened tuberous roots 2 to 3 cm. in diameter, these sometimes moniliform; joints broadly obovate, 3.5 to 12 cm. long, pale green to bluish; areoles few, either small or large; spines confined to the upper and marginal areoles, 1 or 2, slender, 2 to 4 cm. long, usually white but sometimes purplish; glochids yellow, usually few but sometimes abundant; flowers 6 to 7 cm. broad, deep purple; ovary slender, 3 to 3.5 cm. long, with only a few scattered areoles; fruit spineless.

44. **Opuntia setispina** Engelm.; Salm-Dyck, Cact. Hort. Dyck. 1849. 239. 1850.

Chihuahua; type from mountains west of Chihuahua.

Stems branching and spreading, sometimes forming clumps a meter broad, erect and 60 cm. high; joints deep bluish green, somewhat glaucous, often purplish at the areoles, obovate to orbicular, 5 to 15 cm. in diameter; spines 1 to 6 from an areole, white, 2 to 3 cm. long; glochids yellow, very conspicuous on old joints; flowers yellow; fruit purplish, about 4 cm. long.

45. **Opuntia tenuispina** Engelm. Proc. Amer. **3**: 294. 1856.

Opuntia minor C. Muell. Ann. Bot. Syst. Walp. 5: 50. 1858.

Northern Mexico. Western Texas to Arizona; type from El Paso.

Low and spreading but becoming 30 cm. high; joints obovate, attenuate at base, 7 to 15 cm. long, light green; spines 1 to 3 from an areole, slender, usually white but sometimes brownish, 3 to 5 cm. long, the upper spines erect or spreading; glochids brown; flowers yellow, 6 to 7.5 cm. broad; ovary with numerous areoles filled with brown wool and brown glochids; fruit oblong, 2.5 to 4 cm. long; seeds 4 mm. broad or less, very irregular.

46. **Opuntia macrocentra** Engelm. Proc. Amer. Acad. **3**: 292. 1856.

Chihuahua. Arizona to western Texas.

Somewhat bushy, with ascending branches, 60 to 90 cm. high; joints orbicular to oblong, or sometimes broader than long, 10 to 20 cm. long, often bluish or

purplish, sometimes spineless but usually bearing spines at the uppermost areoles; spines 1 or 2, rarely 3, usually brownish or black but sometimes white above, slender, erect or porrect, 4 to 7 cm. long; flowers yellow, often drying red, 7.5 cm. broad; sepals ovate, acuminate; ovary with few areoles, these bearing brown glochids; fruit 3 to 6 cm. long, purple; seeds 4 to 4.5 mm. broad.

47. **Opuntia gosseliniana** Weber, Bull. Soc. Acclim. France **49**: 83. 1902.

Sonora and Baja California.

One meter high or more, branching from the base, the old trunk often bearing numerous long acicular spines; joints mostly red or purplish, usually very thin, as broad as long or broader, sometimes 20 cm. broad; lower and sometimes all the areoles without spines; spines porrect or nearly so, generally 1, sometimes 2, rarely 3 from an areole, 4 to 5 or even 10 cm. long, brown, usually weak; glochids brown, numerous, forming on old joints very large clusters; fruit 4 cm. long, without spines but bearing numerous brown glochids at the areoles, with a depressed umbilicus.

48. **Opuntia azurea** Rose, Contr. U. S. Nat. Herb. **12**: 291. 1909.

Zacatecas and probably Durango.

Compact, upright with a single trunk or branching from the base and more or less spreading; joints orbicular to obovate, 10 to 15 cm. in diameter, pale bluish green, glaucous; areoles about 2 cm. apart, the lower ones spineless, the upper ones with 1 to 3 rather stout spines; spines, at least when old, almost black, unequal, the longer ones 2 to 3 cm. long, more or less reflexed; glochids numerous, brown; petals 3 cm. long, deep yellow, with crimson claw, but in age pink throughout; fruit dull crimson, subglobose to ovoid, spineless, truncate, juicy, edible. "Coyotillo," "nopalillo," "nopal coyotillo" (*Patoni*).

49. **Opuntia phaeacantha** Engelm. in A. Gray, Mem. Amer. Acad. **4**: 52. 1849.

Opuntia chihuahuensis Rose, Contr. U. S. Nat. Herb. **12**: 291. 1909.

Chihuahua. Arizona to western Texas; type from Santa Fe, New Mexico.

Low, usually prostrate, with some branches ascending; joints usually longer than broad, 10 to 15 cm. long; areoles rather remote, the lower ones often spineless; spines 1 to 4, those on the sides of the joints more or less reflexed, somewhat flattened, usually rather stout, brown, sometimes darker at base, often nearly white throughout, the longer ones 5 to 6 cm. long; glochids numerous, yellow to brown; flowers 5 cm. broad, yellow; ovary short; fruit 3 to 3.5 cm. long, much contracted at base.

50. **Opuntia occidentalis** Engelm. & Bigel. Proc. Amer. Acad. **3**: 291. 1856.

Northern Baja California and on the adjacent islands. Southern California.

Erect or spreading, often 1 meter high or more, forming large thickets; joints obovate to oblong, 20 to 30 cm. long; areoles remote; spines 2 to 7, stout, unequal, the longest 4 to 5 cm. long, more or less flattened, brown or nearly white, sometimes wanting; shorter spines often white; glochids often prominent, brown; flowers yellow, often 10 to 11 cm. long; fruit large, purple.

51. **Opuntia engelmannii** Salm-Dyck; Engelm. Bost. Journ. Nat. Hist. **6**: 207. 1850.

Chihuahua, Durango, and Sonora; type from Chihuahua. Texas to Arizona.

Originally described as erect and up to 2 meters high but more properly a widely spreading bush, usually without a definite trunk; joints oblong to orbicular, 20 to 30 cm. long, thick, pale green; areoles distant, becoming large and bulging; spines usually more or less white, with dark red or brownish bases and sometimes with black tips, usually 3 or 4, sometimes only 1, or entirely wanting from the lower areoles, but on old joints 10 or more, usually somewhat

porrect or a little spreading, but never reflexed, the larger ones much flattened, the longest 5 cm. long; glochids numerous, brown with yellowish tips; flowers large, yellow; fruit 3.5 to 4 cm. long, red; seeds 3 to 4 mm. broad.

52. **Opuntia discata** Griffiths, Rep. Mo. Bot. Gard. **19**: 266. 1908.

Northern Sonora. Arizona, the type from the Santa Rita Mountains.

Plants bushy, spreading, sometimes 1.5 meters high; joints thick, orbicular to broadly obovate, 25 cm. in diameter or less, pale bluish green, somewhat glaucous; areoles rather few, distant, in age becoming very large, filled with short brown wool; spines usually 2 to 4, sometimes 7 or more in old areoles, 2 cm. long or more, grayish with dark bases, somewhat flattened; flowers 9 to 10 cm. broad, light yellow, darker near the center; fruit magenta, pyriform, 6 to 7 cm. long.

53. **Opuntia rastrera** Weber, Dict. Hort. Bois 896. 1898.

?*Opuntia lucens* Griffiths, Rep. Mo. Bot. Gard. **19**: 269. 1908.

San Luis Potosí.

Creeping plant; joints circular to obovate, the largest 20 cm. in diameter; spines white, several from an areole, the longest 4 cm. long; glochids yellow; flowers yellow; fruit purple, acid, oboyoid. "Cuija."

54. **Opuntia fuliginosa** Griffiths, Rep. Mo. Bot. Gard. **19**: 262. 1908.

Jalisco; type from Guadalajara.

Tall, treelike, 4 meters high or more, much branched; joints orbicular to oblong, 30 cm. long or less, shining; areoles distant; spines few, rarely as many as 6, dull brown or horn-colored, the longest 4 cm. long, slightly twisted; glochids yellow to brown; flowers at first yellow but in age red, 5 to 6 cm. long (including the ovary); fruit pyriform to short-oblong, 3 to 4 cm. long, red; seeds 5 mm. broad.

55. **Opuntia scheeri** Weber, Dict. Hort. Bois 895. 1898.

Mexico.

About 1 meter high, branching at base, the lower branches sprawling over the ground; joints oblong to orbicular, 15 to 30 cm. long, bluish green; areoles circular, elevated, filled with short brown wool; spines 10 to 12, yellow, acicular, each surrounded by a row of long, white or yellow hairs; flowers large, pale yellow, in age salmon-colored; fruit globular, red, juicy, truncate; seeds 4 mm. broad, with a broad irregular margin.

56. **Opuntia chlorotica** Engelm. & Bigel. Proc. Amer. Acad. **3**: 291. 1856.

Sonora and Baja California. New Mexico to California.

Erect-bushy, sometimes 2 meters high or more, with a definite trunk; main branches nearly erect; joints ovate to orbicular, sometimes broader than long, 15 to 20 cm. long, more or less glaucous, bluish green; areoles closely set, prominent; spines yellow, several, most of them usually appressed and reflexed, setaceous, 3 to 4 cm. long; glochids yellow, numerous, elongate, persistent; flowers yellow, 6 to 7.5 cm. broad; fruit purple without, green within, 4 cm. long; seeds small.

57. **Opuntia dillenii** (Gawler) Haw. Suppl. Pl. Succ. 79. 1819.

Cactus dillenii Gawler in Edwards, Bot. Reg. **3**: *pl. 255*. 1818.

Eastern coast of Mexico. West Indies and southeastern United States.

Low spreading bushes growing in broad clumps and often forming dense thickets, or tall and much branched, 2 to 3 meters high, sometimes with definite terete trunks; joints obovate to oblong, 7 to 40 cm. long, bluish green, somewhat glaucous, but bright green when young, the areoles somewhat elevated;

areoles often large, filled with short brown or white wool when young, usually few and remote, on old joints 10 to 12 mm. in diameter; spines often 10 from an areole on first-year joints, very variable, usually more or less flattened and curved, sometimes terete and straight, yellow, more or less brown-banded or mottled, often brownish in age, sometimes 7 cm. long but usually shorter, sometimes few or none; glochids numerous, yellow; wool in areoles short, sometimes brown, sometimes white; flowers in the typical form lemon-yellow, in some forms red from the first, 7 to 8 cm. long; fruit pear-shaped to subglobose, narrowed at base, 5 to 7.5 cm. long, purplish, spineless, juicy.

58. Opuntia tapona Engelm.; Coulter, Contr. U. S. Nat. Herb. **3**: 423. 1896.

Baja California; type collected near Loreto.

Low spreading plants, rarely over 60 cm. high; joints glabrous, orbicular to obovate, 20 to 25 cm. in diameter, turgid, pale green; spines 2 to 4, yellow, one much longer, 5 to 7 cm. long, slender, porrect or sometimes curved downward; glochids brownish; fruit 4 to 6 cm. long, clavate, dark purple without, red within, spineless. "Tuna tapona."

59. Opuntia lindheimeri Engelm. Bost. Journ. Nat. Hist. **6**: 207. 1850.

Opuntia squarrosa Griffiths, Bull. Torrey Club **43**: 91. 1916.

Tamaulipas. Texas and Louisiana; type from New Braunfels, Texas.

Usually erect, 2 to 4 meters high, with a more or less definite trunk, but at times much lower and spreading; joints green or bluish green, somewhat glaucous, orbicular to obovate, up to 25 cm. long; areoles distant, often 6 cm. apart; spines usually 1 to 6, often only 2, one porrect and 4 cm. long or more, the others somewhat shorter and only slightly spreading, pale yellow to nearly white, sometimes brownish or blackish at base, or some plants spineless; glochids yellow or sometimes brownish; petals yellow to dark red; fruit purple, pyriform to oblong, 3.5 to 5.5 cm. long. "Nopal," "nopal azul," "cacanapa" (Texas).

60. Opuntia cantabrigiensis Lynch, Gard. Chron. III. **33**: 98. 1903.

Opuntia engelmanii cuija Griffiths & Hare, N. Mex. Agr. Expt. Sta. Bull. **60**: 44. 1906.

Opuntia cuija Britt. & Rose, Smiths. Misc. Coll. **50**: 529. 1908.

San Luis Potosí, Querétaro, and Hidalgo.

Rounded bushy plant, 1 to 2 meters high; joints orbicular to obovate, 12 to 20 cm. long, rather pale bluish green, areoles remote, large, filled with brown wool; spines usually 3 to 6 but sometimes more, somewhat spreading, acicular, yellow with brown or reddish bases, 1.5 to 4 cm. long; glochids numerous, 1 cm. long or more, yellowish, not forming a brush; flowers 5 to 6 cm. long, yellowish with reddish center; upper areoles on the ovary bearing long bristles; fruit globular, about 4 cm. in diameter, purple; seeds numerous, 4 mm. in diameter. "Cuija" (San Luis Potosí).

61. Opuntia pyriformis Rose, Contr. U. S. Nat. Herb. **12**: 292. 1909.

Zacatecas, the type from Hacienda de Cedros.

Plants 3 to 5 meters high, with widely spreading branches, the lower ones almost resting on the ground and 3 to 5 meters long; joints obovate, thick, 18 cm. long or more; areoles closely set, small; spines 1 or 2, on old joints more, usually reflexed, slender, weak, yellow, 10 to 22 mm. long; flowers yellow; fruit 4 cm. long, somewhat tuberculate, spineless, its large areoles crowded with brown hairs forming hemispheric cushions.

62. **Opuntia durangensis** Britt. & Rose, Smiths. Misc. Coll. **50**: 518. 1908.

Durango.

Joints broadly obovate, about 20 cm. long, 16 cm. broad, pale green, glabrous or minutely puberulent, bearing numerous areoles, these 1 to 2 cm. apart, elevated; spines 3 to 5 at an areole, short, 1.5 cm. long or less, pungent, spreading, yellow but in age becoming darker; glochids brown, 2 to 3 mm. long; flowers yellow, 5 cm. long; petals broad, apiculate; ovary 3 to 4 cm. long, finely pubescent, bearing many areoles with numerous glochids and a few spines; fruit white or red; seeds about 3 mm. broad.

63. **Opuntia atropes** Rose, Smiths. Misc. Coll. **50**: 518. 1908.

Morelos, the type from Yautepec.

Plants 1 to 3 meters high, much branched; joints oblong to obovate, 20 to 30 cm. long, deep green, softly pubescent; young joints somewhat glossy; areoles circular, filled with short tawny wool; young spines white or yellowish; old spines 3 to 6 cm. long, somewhat angled, standing almost at right angles to the joints, dark yellow or brown at the base, much lighter and often white above; glochids numerous, long, yellow; petals reddish; ovary pubescent, covered with large cushion-like areoles bearing long glochids near the top but with few spines or none, truncate at apex.

64. **Opuntia affinis** Griffiths, Proc. Biol. Soc. Washington **27**: 27. 1914.

Oaxaca.

Arborescent, sometimes 2 meters high or more; joints obovate, 35 cm. long, broadly rounded above and gradually narrowed below, densely silky; areoles obovate, 3 mm. long, 3 cm. apart; glochids light straw-colored, 3 mm. long; spines 1 to 5 in the upper areoles, straw-colored, becoming white, the longest 3 cm. long, divergent, flattened, angular, twisted; flowers dull dark red in bud, about 3 cm. in diameter; petals 2 to 2.5 cm. long; ovary subglobose, deeply pitted, 15 to 17 mm. in diameter, with small brown areoles 4 mm. apart; fruit subglobose, small, red.

65. **Opuntia macdougaliana** Rose, Smiths. Misc. Coll. **50**: 516. 1908.

Opuntia micrarthra Griffiths, Monatsschr. Kakteenk. **23**: 130. 1913.

Southern Mexico, the type from Tehuacán, Puebla.

Plants about 4 meters high, with a distinct cylindric trunk branching from near the base; joints oblong, 30 cm. long by 8 to 10 cm. broad, softly pubescent; areoles distinct, small; spines generally 4, one much longer (2.5 to 4 cm. long), somewhat flattened, yellowish, becoming whitish in age; glochids short, numerous, yellow; fruit globular to oblong, 5 cm. long, the surface divided into diamond-shaped plates, red, with a broad deep cup at apex, the numerous small rounded areoles filled with clumps of yellow glochids, very rarely with one or two spines.

66. **Opuntia velutina** Weber; Goss. Bull. Mus. Hist. Nat. **10**: 389. 1904.

Opuntia nelsonii Rose, Smiths. Misc. Coll. **50**: 516. 1908.

Southern Mexico; type from Guerrero.

Stems 1 to 4 meters high; joints flattened, oblong to obovate, 15 to 20 cm. long, 10 to 15 cm. broad near the top, pubescent, pale, yellowish green in herbarium specimens; areoles 2 to 3 cm. apart; spines 2 to 6, yellow, becoming white in age, very unequal, the longer ones 3 to 4 cm. long; bristles many, yellow, becoming brownish; flowers rather small; petals yellow, 1 to 3 cm. long; ovary pubescent, bearing many yellowish brown bristles; filaments red; fruit "dark red."

67. **Opuntia wilcoxii** Britt. & Rose, Cactaceae 1: 172. 1919.

Sonora and Sinaloa; type from Fuerte, Sinaloa.

Tall, bushy, 1 to 2 meters high, very much branched; joints oblong, thinnish, 20 cm. long, dark green, more or less purplish about the large areoles, finely puberulent; glochids numerous, long, yellow; spines 1 to 3, one very long (5 to 6 cm.), porrect, white or somewhat yellowish; flowers 6 cm. long, yellow; ovary bearing a few large areoles, these filled with brown wool and yellow glochids; fruit pubescent, 4 cm. long.

68. **Opuntia tomentosa** Salm-Dyck, Obs. Bot. 3: 8. 1822.

Cactus tomentosus Link, Enum. Hort. Berol. 2: 24. 1822.

Opuntia oblongata Wendl.; Pfeiff. Enum. Cact. 161. 1837.

Opuntia icterica Griffiths, Monatsschr. Kakteenk. 23: 138. 1913.

Central Mexico; escaped from cultivation in Australia.

Becoming 3 to 6 meters high or more, with a broad top and a smooth trunk 10 to 30 cm. in diameter; joints oblong to narrowly obovate, 10 to 20 cm. long, velvety-pubescent, somewhat tuberculate when young; glochids yellow; spines usually wanting but sometimes 1 or more; flowers orange, 4 to 5 cm. long; fruit ovoid, red, sweetish; seeds 4 mm. broad.

69. **Opuntia guilanchi** Griffiths, Rep. Mo. Bot. Gard. 19: 265. 1908.

Zacatecas.

Becoming 1.5 to 2 meters high, often with a distinct trunk 1.5 to 2.5 cm. in diameter; joints broadly obovate, 14 to 16 cm. wide, 20 to 24 cm. long, minutely pubescent; spines at first white, slightly flattened, the longest 2 cm. long; glochids light yellow; fruit subglobose, 4 cm. in diameter, pubescent, variously colored, aromatic. "Nopal guilanchi."

70. **Opuntia leucotricha** DC. Mém. Mus. Hist. Nat. 17: 119. 1828.

Opuntia fulvispina Salm-Dyck; Pfeiff. Enum. Cact. 164. 1837.

Central Mexico.

Often 3 to 5 meters high, with a large top; trunk as well as the older joints covered with long white bristles; joints oblong to orbicular, 1 to 2 cm. long, pubescent; areoles closely set, the upper part filled with yellow glochids, the lower part at first with only 1 to 3 weak white spines; flowers (including ovary) 4 to 5 cm. long; petals yellow, broad; ovary with numerous areoles, the upper ones bearing long bristly glochids (1 cm. long); fruit variable, 4 to 6 cm. long, white or red, the rind not easily coming off from the pulp, aromatic, edible. "Nopal duraznillo" (Durango); "tuna duraznillo" (Zacatecas); "duraznillo," "duraznillo blanco," "duraznillo colorado."

The following are probably synonymous with this species: *Opuntia leucosticta* Wendl. (Pfeiff. Enum. Cact. 167. 1837); *O. leucacantha* Link & Otto (Salm-Dyck, Hort. Dyck. 362. 1834).

71. **Opuntia orbiculata** Salm-Dyck; Pfeiff. Enum. Cact. 156. 1837.

Opuntia crinifera Salm-Dyck; Pfeiff. Enum. Cact. 157. 1837.

Opuntia lanigera Salm-Dyck, Cact. Hort. Dyck. 1849. 65. 1850.

Northern Mexico.

Plants without a very definite trunk, about 1 meter high, often broader than high; joints green or bluish green, orbicular to obovate, sometimes spatulate, about 15 cm. long; areoles small, in seedlings and young plants producing long white hairs or long-persistent wool; spines acicular, several, yellow; flowers yellow.

72. **Opuntia pilifera** Weber, Dict. Hort. Bois 894. 1898.

Puebla.

Becoming 4 to 5 meters high, with a definite thick woody cylindric trunk and a broad rounded top; joints oblong to orbicular, 10 to 30 cm. long, obtuse at apex, pale green; areoles 2 to 3 cm. apart, scarcely elevated; spines 2 to 9, white, slightly spreading, acicular, the outer part of the areole filled with nearly white, more or less deciduous hairs 2 to 3 cm. long; flowers large, red; areoles on the ovary bearing brown glochids and deciduous hairs, the latter especially abundant toward the top of the ovary; fruit red, juicy.

73. **Opuntia ficus-indica** (L.) Mill. Gard. Dict. ed. 8. *Opuntia* No. 2. 1768.

Cactus ficus-indica L. Sp. Pl. 468. 1753.

Central Mexico, widely cultivated. Generally planted in tropical regions.

Large and bushy or sometimes erect and treelike and then with a definite woody trunk, up to 5 meters high, usually with a large top; joints oblong to spatulate-oblong, usually 30 to 50 cm. long, sometimes even larger; areoles small, usually spineless; glochids yellow, numerous, soon dropping off; flowers normally bright yellow, 7 to 10 cm. broad; ovary 5 cm. long; fruit normally red, edible, 5 to 9 cm. long, with a low depressed umbilicus. "Nopal de Castilla," "tuna de Castilla," "nochtli."

74. **Opuntia crassa** Haw. Suppl. Pl. Succ. 81. 1819.

Widely cultivated in Mexico.

Plants 1 to 2 meters high, somewhat branched; joints ovate to oblong, 8 to 12.5 cm. long, thick, bluish green, glaucous; areoles bearing brown wool and brown glochids; spines wanting or sometimes 1 or 2, acicular, 2.5 cm. long or less; flowers and fruit unknown.

75. **Opuntia undulata** Griffiths, Rep. Mo. Bot. Gard. **22**: 32. 1912.

Opuntia undosa Griffiths, Monatsschr. Kakteenk. **23**: 139. 1913.

Widely cultivated in Mexico; type from Aguascalientes.

Plants tall, large, open-branched, with trunk often 30 cm. or more in diameter; joints very large, obovate, about 55 cm. long, glossy light yellowish green at first; areoles subcircular to obovate, 4.5 mm. long, 5 to 6 cm. apart; glochids yellow, 1 mm. long; spines white, few, erect, flattened, straight or twisted, 1 to 1.5 cm. long; fruit 9 to 10 cm. long, dull red.

76. **Opuntia spinulifera** Salm-Dyck, Hort. Dyck. 364. 1834.

Opuntia candelabriformis Mart.; Pfeiff. Enum. Cact. 159. 1837.

Opuntia oligacantha Salm-Dyck, Cact. Hort. Dyck. 1849. 241. 1850.

Mexico.

Tall much-branched plant; joints orbicular to oblong, sometimes obovate, 20 to 30 cm. long, glabrous, a little glaucous; leaves small, red, 4 to 6 mm. long; areoles on young joints usually small, sometimes longer than broad, the margin at first bordered with cobwebby hairs, afterwards with short white hairs, either spineless or with short white bristle-like spines; areoles on old joints more or less sunken, rather close together; spines on old joints 1 to 3, 1 to 2 cm. long, subulate, bone-colored.

77. **Opuntia lasiacantha** Pfeiff. Enum. Cact. 160. 1837.

Central Mexico.

A tall plant, with a more or less definite trunk; joints obovate to oblong, 20 to 30 cm. long; areoles small, 2 to 3 cm. apart; spines usually 1 to 3, acicular, white, 2 to 4 cm. long, slightly spreading; glochids numerous, prominent, dirty yellow to brown; flowers yellow or deep orange, 6 to 8 cm. broad;

ovary bearing long brown deciduous bristles, especially from the upper areoles.

Opuntia chaetocarpa Griffiths[1] is perhaps the same species. *O. zacuapanensis* Berger[2] is closely related.

78. **Opuntia hyptiacantha** Weber, Dict. Hort. Bois 894. 1898.

Opuntia nigrita Griffiths, Rep. Mo. Bot. Gard. **21**: 169. 1910.

?*Opuntia cretochaeta* Griffiths, Proc. Biol. Soc. Washington **29**: 11. 1916.

Oaxaca.

A tall much-branched plant; joints oblong to obovate, 20 to 30 cm. long, pale green, but when young bright green; spines on young joints single, porrect, and accompanied by 2 or 3, sometimes many, white, slightly pungent hairs; spines on old joints 4 to 6, somewhat spreading or appressed, 1 to 2 cm. long; glochids few, brownish; areoles small, 1.5 cm. apart; leaves small, brownish; flowers red; fruit globular, yellowish, its areoles filled with long weak glochids; umbilicus broad, only slightly depressed.

Opuntia chavena Griffiths[3] is perhaps the same species. It is said to be known in Aguascalientes as "nopal cadillo," "nopal chaveño," and "nopal cascarón."

79. **Opuntia streptacantha** Lem. Cact. Hort. Monv. 62. 1839.

San Luis Potosí and elsewhere in central Mexico.

Much branched, up to 5 meters high, sometimes with a trunk 45 cm. in diameter; joints obovate to orbicular, 25 to 30 cm. long, dark green; areoles small, rather close together for this group; spines numerous, spreading or some of them appressed, white; glochids reddish brown, very short; flowers 7 to 9 cm. broad, yellow to orange, the sepals reddish; fruit globular, 5 cm. in diameter, dull red or sometimes yellow within and without. "Tuna cardona," "nopal cardón."

This is one of the most important economic Opuntias of Mexico. It has sometimes been reported as *O. cardona*, a name which has never been properly published.

Opuntia pachona Griffiths[4] is closely related and perhaps only a form of this species.

80. **Opuntia amyclaea** Ten. Fl. Neap. Prodr. App. **5**: 15. 1826.

Doubtless native of Mexico, but not known in the wild state.

Erect; joints oblong to elliptic, 30 to 40 cm. long, about twice as long as broad, thick, dull green, a little glaucous; areoles small, with 1 or 2 short bristles from the lower parts of areoles; spines 1 to 4, stiff, nearly porrect, usually less than 3 cm. long, white or horn-colored, the stoutest angled; glochids brown, soon disappearing; flowers yellow; fruit yellowish red, not very juicy.

81. **Opuntia megacantha** Salm-Dyck, Hort. Dyck. 363. 1834.

Opuntia castillae Griffiths, Rep. Mo. Bot. Gard. **19**: 261. 1908.

?*Opuntia incarnadilla* Griffiths, Rep. Mo. Bot. Gard. **22**: 27. 1912.

Much cultivated in Mexico.

Plants tall, 4 to 5 meters high or more, with a more or less definite woody trunk; joints of large plants obovate to oblong, often oblique, sometimes 40 to 60 cm. long or more, pale dull green, slightly glaucous; areoles rather small, on

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[1] Proc. Biol. Soc. Washington **27**: 25. 1914.

[2] Hort. Mortol. 413. 1912.

[3] Rep. Mo. Bot. Gard. **19**: 264. *pl. 23*. 1908.

[4] Rep. Mo. Bot. Gard. **21**: 168. *pl. 22*. 1910

large joints often 4 to 5 cm. apart, when young bearing brown wool; spines white, usually 1 to 5, slightly spreading, sometimes nearly porrect, usually only 2 to 3 cm. long, sometimes few and confined to the upper areoles; glochids few, yellow, caducous, sometimes appearing again on old joints; flowers yellow to orange, about 8 cm. broad; ovary spiny or spineless, obovoid; fruit 7 to 8 cm. long. "Nopal de Castilla."

This is the species from which the best edible tunas are obtained. Many of the varieties have local names.

Opuntia tribuloides Griffiths[1] is a closely related form.

82. **Opuntia robusta** Wendl.; Pfeiff. Enum. Cact. 165. 1837.

Opuntia flavicans Lem. Hort. Monv. 61. 1839.

Opuntia larreyi Weber; Coulter, Contr. U. S. Nat. Herb. 3: 423. 1896.

Opuntia gorda Griffiths, Monatsschr. Kakteenk. 23: 134. 1913.

Central Mexico.

Often erect, sometimes 5 meters high, usually much branched; joints orbicular to oblong, 20 to 25 cm. long, 10 to 12.5 cm. broad, very thick, bluish green, glaucous; spines 8 to 12, stout, very diverse, brown or yellowish at base, white above, up to 5 cm. long; flowers 5 cm. broad, yellow; fruit globular to ellipsoid, at first more or less tuberculate, deep red, 7 to 9 cm. long. "Tuna tapona," "tuna camuesa."

Opuntia albicans Salm-Dyck[2] is said by Berger to be closely related to this species. *O. megalarthra* Rose,[3] known in Zacatecas as "rastrero," is closely related; also *O. cochinera* Griffiths,[4] which is called "cochinera" in the same state.

83. **Opuntia guerrana** Griffiths, Rep. Mo. Bot. Gard. 19: 266. 1908.

Hidalgo, the type from Dublán.

Plants 90 to 120 cm. high, with an open branching top; joints oblong to orbicular, 15 to 25 cm. long, thick, glaucous; areoles 5 mm. in diameter, filled with tawny wool; spines white to yellow, 1 to 6, flattened, twisted; petals yellow; fruit globose, greenish white, 4 to 5 cm. in diameter. "Nopal tapón."

84. **Opuntia stenopetala** Engelm. Proc. Amer. Acad. 3: 289. 1856.

Coahuila to Querétaro and Hidalgo; type from Buena Vista, Coahuila.

Low bushy plant, often forming thickets, the main branches procumbent and resting on the edges of the joints; joints obovate to orbicular, 10 to 20 cm. long, grayish green, but often more or less purplish, very spiny; areoles often remote, 1 to 3 cm. apart, the lower ones often without spines, bearing white wool when young; spines usually reddish brown to black, but sometimes becoming pale, usually 2 to 4, the longest 5 cm. long, the larger ones somewhat flattened; glochids very abundant on young joints, brown; flowers dioecious, including the ovary only 3 cm. long; petals orange-red, very narrow, 10 to 12 mm. long, with long acuminate tips; ovary leafy, the upper leaves similar to the sepals; fruit globular, 3 cm. in diameter, acid, naked or spiny; seeds smooth, 3 mm. in diameter, with broad rounded margins. "Nopal lasarón" (San Luis Potosí); "nopal colorado" (Zacatecas).

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[1] Monatsschr. Kakteenk. 23: 137. 1913.

[2] Hort. Dyck. 361. 1834.

[3] Smiths. Misc. Coll. 50: 529. 1908.

[4] Rep. Mo. Bot. Gard. 19: 263. *pl. 26.* 1908.

85. **Opuntia glaucescens** Salm-Dyck, Hort. Dyck. 362. 1834.

Mexico.

Probably erect; joints erect, oblong-obovate, 12 to 15 cm. long, 5 cm. broad, sometimes narrowed at both ends, pale green, glaucous, usually purplish around the areoles; areoles filled with gray wool; spines 1 to 4, elongate, acicular, white, 2.5 cm. long; glochids brownish to rose-colored.

86. **Opuntia grandis** Pfeiff. Enum. Cact. 155. 1837.

Mexico, but localities not known.

More or less erect, 60 cm. high or more; joints oblong, 12 to 18 cm. long, erect, when young reddish, glaucous; spines few, white; flowers small, a little open, 2 cm. broad; petals few, narrowly lanceolate, 12 mm. long.

87. **Opuntia chaffeyi** Britt. & Rose, Contr. U. S. Nat. Herb. **16**: 241. 1913.

Zacatecas, the type from Hacienda de Cedros, near Mazapil.

Perennial by a large fleshy deep-seated root or rootstock often 35 cm. long by 4 cm. in diameter; stems normally annual, 5 to 15 cm. long, much branched, often weak and prostrate; joints elongate, 3 to 5 cm. long, 6 to 7 mm. broad, slightly flattened, glabrous, pale bluish green or sometimes purplish; areoles small, circular, with white wool in the lower parts and brown wool in the upper parts; spines 1, rarely 2 or 3, acicular, 2 to 3 cm. long, whitish or pale yellow; glochids numerous, pale yellow; flower 6 cm. broad; petals 7 to 9, pale lemon-yellow, but slightly pinkish on the outside; ovary deeply umbilicate, somewhat club-shaped, 4 to 5 cm. long, bearing flattened tubercles and large areoles filled with white wool; upper areoles on ovary bearing also white bristly spines; ovules numerous, borne in the upper third of the ovary.

5. **GRUSONIA** F. Reichenb.; Schum. Monatsschr. Kakteenk. **6**: 177. 1896.

A single species is known.

1. **Grusonia bradtiana** (Coulter) Britt. & Rose, Cactaceae **1**: 215. 1919.

Cereus bradtianus Coulter, Contr. U. S. Nat. Herb. **3**: 406. 1896.

Grusonia cereiformis F. Reichenb.; Schum. Monatsschr. Kakteenk. **6**: 177. 1896.

Opuntia bradtiana K. Brandeg. Erythea **5**: 121. 1897.

Coahuila.

Forming dense, often impenetrable thickets 2 meters high or less, very spiny; stems light green, 4 to 7 cm. thick, with 8 to 10 low, longitudinal, somewhat tuberculate ribs; areoles 1 to 1.5 cm. apart, 3 to 5 mm. in diameter; leaves linear, fleshy, green, 8 mm. long, early deciduous; spines 15 to 25, yellowish brown when young, soon becoming white, acicular, terete or slightly compressed, 1 to 3 cm. long, not sheathed, some of the longer ones reflexed; wool white, turning brown, early disappearing; corolla rotate, opening in bright sunlight, 3 to 4 cm. broad; sepals ovate, acute, fleshy; petals bright yellow, spatulate, fringed; filaments brownish yellow; areoles of the ovary with long weak yellow spines, white wool, and yellow glochids; berry (according to Schumann) ellipsoid, deeply umbilicate. "Organillo" (*Patoni*).

6. **CEPHALOCEREUS** Pfeiff. Allg. Gartenz. **6**: 142. 1838.

Elongate cacti, various in habit, mostly columnar and erect, sometimes much branched with a short trunk or in one species with spreading and procumbent branches; in some species the flowering areoles develop an abundance of wool which confluently forms a dense mass called a pseudocephalium either at the top or on one side near the top; in others long wool or hairs grow from the

areoles but a pseudocephalium is not formed; in others the flowers are produced in a circle at the top and the bristles and fruit afterwards form a collar at the base of the new growth; in other species neither wool nor hairs are produced in the flowering areoles; flowers nocturnal, short-campanulate to short-funnelform or pyriform, straight or curved; perianth persisting on the ripening fruit, except in one species; fruit usually depressed-globose, sometimes oblong; seeds black, smooth or tuberculate.

Numerous additional species occur in tropical and subtropical America.

Flowering areoles confluent, forming a pseudocephalium.
  Pseudocephalium lateral.
    Plant cylindric, the top rounded; bristles of the pseudocephalium twice as long as the wool----------1. C. senilis.
    Plant tapering to the apex; bristles of the pseudocephalium little longer than the wool----------2. C. hoppenstedtii.
  Pseudocephalium terminal----------3. C. macrocephalus.
Flowering areoles not confluent, not forming a pseudocephalium.
  Ribs 15 to 18; flowers red----------4. C. polylophus.
  Ribs 4 to 13; flowers mostly whitish to purplish.
    Flowering areoles without wool or wool very short------5. C. scoparius.
    Flowering areoles definitely long-woolly.
      Ribs only 5 to 6 mm. high----------13. C. purpusii.
      Ribs 8 mm. high or higher.
        Plants light or dark green----------6. C. gaumeri.
        Plants, at least young joints, blue or bluish green, glaucous.
          Young spines yellow----------7. C. chrysacanthus.
          Young spines brown or nearly black.
            Ribs 9 to 12.
              Wool short, 2 cm. long----------8. C. cometes.
              Wool 10 cm. long----------9. C. leucocephalus.
            Ribs 7 to 9.
              Flowers rose-red----------10. C. sartorianus.
              Flowers brown----------11. C. palmeri.

1. Cephalocereus senilis (Haw.) Pfeiff. Allg. Gartenz. 6: 142. 1838.

Cactus senilis Haw. Phil. Mag. 63: 31. 1824.

Cactus bradypus Lehm. Delect. Sem. Hort. Hamb. 17. 1826.

Cereus senilis DC. Prodr. 3: 464. 1828.

Pilocereus senilis Lem. Cact. Hort. Monv. 7. 1839.

Echinocactus staplesiae Tate; Loud. Gard. Mag. 16: 27. 1840.

Hidalgo and Guanajuato.

Plants 6 to 10 or even 15 meters high, columnar, simple or rarely branched above, sometimes branched at base; ribs numerous; pseudocephalium developing on plants when 6 meters high, broadening above, rarely confined to one side but usually encircling the top of the plant; areoles closely set, the ones at base of old plants producing weak gray bristles 20 to 30 cm. long, the ones in the pseudocephalium producing similar but shorter bristles intermixed with dense, tawny wool, 4 to 6 cm. long; flower (including ovary) 5 cm. long, rose-colored; scales few on the tube; fruit obovoid, 2.5 to 3 cm. long, rose-colored, capped by the chartaceous base of the flower, bearing a few minute scales with hairs in their axils. "Cabeza de viejo," "viejo," "viejito."

This is one of the cacti most cultivated in northern hothouses, where it is known as "old man cactus." The young plants are densely covered with long white hairs. The species is very abundant on the limestone hills of eastern Hidalgo, where it is often the most conspicuous plant.

2. **Cephalocereus hoppenstedtii** (Weber) Schum. in Engl. & Prantl, Pflanzenfam. 3[6a]: 181. 1894.

Pilocereus hoppenstedtii Weber, Cat. Pfersdorff. 1864.

Pilocereus hagendorpi Regel, Gartenflora **18**: 220. 1869.

Pilocereus lateralis Weber, Dict. Hort. Bois 966. 1898.

Cereus hoppenstedtii Berger, Rep. Mo. Bot. Gard. **16**: 70. 1905.

Southern Mexico, the type from Zapotitlán, Puebla.

Slender, columnar, said sometimes to reach 10 meters in height, often bent or clambering, the apex tapering; ribs low, close together, 20 or more, the whole plant hidden under the numerous spines; areoles close together; radial spines 14 to 18, very short, white; central spines 5 to 8, the longest one sometimes 7.5 cm. long, usually reflexed, brownish; pseudocephalium at the top of the plant but to one side (said to be on the north side); flower described as 7.5 cm. long, whitish, with rosy tips, bell-shaped.

3. **Cephalocereus macrocephalus** Weber; Schum. Gesamtb. Kakt. 197. 1897.

Cereus macrocephalus Berger, Rep. Mo. Bot. Gard. **16**: 62. 1905.

Puebla, the type from Tehuacán.

Plant of great size, 10 to 16 meters high, with a very solid woody trunk 30 to 60 cm. in diameter, simple or with a few ascending branches; pseudocephalium not so conspicuous as in *Cephalocereus senilis;* ribs numerous (about 24), low, obtuse, pale green; radial spines about 12, spreading; central spines several, sometimes 6 cm. long; flowering areoles spineless but bearing white stiff hairs or weak bristles; perianth about 5 cm. long, the tube bearing a few distant scales, the limb short, the outer segments rounded.

4. **Cephalocereus polylophus** (DC.) Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 419. 1909.

Cereus polylophus DC. Mém. Mus. Hist. Nat. **17**: 115. 1828.

Eastern Mexico.

Erect, with simple stems 10 to 13 meters high, green; ribs 15 to 18; areoles small, 1 cm. apart or less, bearing white felt but no wool; spines 7 or 8, yellow, straight, spreading; central spine single, longer than the others; flowers 4 to 5 cm. long, about 3 cm. broad at top, narrowly funnelform; free part of tube 6 to 8 mm. long with ridges down the inside; stamens included, inserted on the throat; inner perianth segments probably red, broad and short, rounded at apex; ovary somewhat tuberculate; scales small, without felt, wool, or hairs in their axils; scales of flower tube small, acute, spreading, with the tip reflexed.

5. **Cephalocereus scoparius** (Poselger) Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 419. 1909.

Pilocereus scoparius Poselger, Allg. Gartenz. **21**: 126. 1853.

Cereus scoparius Berger, Rep. Mo. Bot. Gard. **16**: 63. 1905.

Type from La Soledad, Veracruz.

Stems 6 to 7.5 meters high, 30 cm. or more in diameter; younger branches with 12 to 15 ribs, these blunt; areoles 1.5 to 2.5 cm. apart, naked; radial spines 5, somewhat bent downward, 5 to 8 mm. long; central spine 1, stout, bent upward, 2.5 cm. long; flowering branches with 20 to 25 ribs; flowers small, reddish; fruit red, small.

6. **Cephalocereus gaumeri** Britt. & Rose, Cactaceae **2**: 47. 1920.

Yucatán.

Plant 6 meters high, light green, slender, often only 2 to 3 cm., but sometimes 6 cm., in diameter; ribs 8 or 9, 6 to 8 mm. high; areoles 6 to 10, bearing short felt and cobwebby hairs when young; flowering areoles bearing tufts

of white wool 1 to 2 cm. long, 1 to 2 mm. apart; spines 15 to 25, acicular, 1 to 5 cm. long, yellowish brown when young; flowers "light green," 5 to 7 cm. long; scales on the ovary and lower part of the flower tube few, minute, acute; scales on upper part of the tube and outer perianth segments broadly ovate, acute; inner perianth segments oblong, acute; stamens included; style long exserted; fruit depressed, brownish, somewhat ridged, 4.5 cm. long.

7. **Cephalocereus chrysacanthus** (Weber) Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 416. 1909.

Pilocereus chrysacanthus Weber; Schum. Gesamtb. Kakt. 178. 1897.

Cereus chrysacanthus Orcutt, West Amer. Sci. **13**: 63. 1902.

Puebla and Oaxaca; type from Tehuacán, Puebla.

Plant 3 to 5 meters high, branching near the base; branches erect or ascending, glaucous; ribs about 12; areoles about 1 cm. apart; spines 12 to 15, the longer ones 3 to 4 cm. long, at first golden yellow, becoming darker in age; flowers borne in definite zones on one side of the branch, accompanied by dense masses of long white hairs, nocturnal, 7 to 8 cm. long, rose-red; fruit smooth, reddish or purplish, about 3 cm. in diameter, the flesh red; seeds black.

8. **Cephalocereus cometes** (Scheidw.) Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 416. 1909.

Cereus cometes Scheidw. Allg. Gartenz. **8**: 339. 1840.

Pilocereus jubatus Salm-Dyck; Först. Handb. Cact. 356. 1846.

Cereus flavicomus Salm-Dyck, Cact. Hort. Dyck. 1849. 202. 1850.

San Luis Potosí.

Erect, cylindric; ribs 12 to 15, hardly tuberculate, obtuse; areoles close together, round; spines unequal, straight, spreading, 2 cm. long or less, flesh-colored or brownish, becoming gray; flowering areoles bearing masses of yellow hairs or wool, longer than the spines.

9. **Cephalocereus leucocephalus** (Poselger) Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 417. 1909.

Pilocereus leucocephalus Poselger, Allg. Gartenz. **21**: 126. 1853.

Pilocereus houllctii Lem. Rev. Hort. **1862**: 428. 1862.

Pilocereus foersteri Lem. Illustr. Hort. Lem. **13**: under *pl. 472*. 1866.

Sonora and Chihuahua; type from Horcasitas, Sonora.

Plants 2 to 5 meters high, branched below, the branches 3 to 15, erect or ascending; ribs usually 12, low; spines about 10 in each cluster, acicular, 12 to 20 mm. long; flowering areoles clustered on one side of the plant toward the top and producing an abudance of long white hairs (sometimes 4 to 10 cm. long).

10. **Cephalocereus sartorianus** Rose, Contr. U. S. Nat. Herb. **12**: 419. 1909.

Veracruz.

Plant 3 to 5 meters high or more, with nearly erect branches, these 7 to 10 cm. in diameter, bluish or bluish green; ribs 7, 2 cm. high, marked by a pair of grooves descending obliquely, one on each side, from each areole; areoles usually 1.5 cm. apart; radial spines at first 7 or 8, others apparently developing later; central normally one; all spines short, 1 cm. long or less, at first straw-colored, in age grayish; all areoles producing few or many cobwebby hairs; flowering areoles appearing on one side of the plant, producing long white hairs 4 to 6 cm. long; flowers 6 to 8 cm. long, "dirty rose-red"; fruit red.

11. Cephalocereus palmeri Rose, Contr. U. S. Nat. Herb. 12: 418. 1909.
Cereus victoriensis Vaupel, Monatsschr. Kakteenk. 23: 24. 1913.
Eastern Mexico; type from Victoria, Tamaulipas.

Tall, 2 to 6 meters high, with 20 branches or more (often 5 to 8 cm. in diameter), dark green or when young glaucous and bluish; ribs 7 to 9, rounded on the edge, rather closely set, clothed from top downward for 20 to 30 cm. with long white hairs (4 to 5 cm. long) usually hiding the brown spines; radial spines 8 to 12, slender, the central one much longer than the others, 2 to 3 cm. long; areoles 1 cm. apart, scarcely woolly except toward the top; flowers 6 cm. long, somewhat tubular, purplish to brownish, the ovary without spines or hairs; fruit globular, about 6 cm. in diameter, naked but the surface somewhat warty; seeds black, shining, minutely pitted, 2 mm. long, oblique at base.

12. Cephalocereus alensis (Weber) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 415. 1909.
Pilocereus alensis Weber; Goss. Bull. Mus. Hist. Nat. 11: 508. 1905.
Cereus alensis Vaupel, Monatsschr. Kakteenk. 23: 23. 1913.
Western Mexico; type from Sierra del Alo.

Erect, sometimes 5 to 6 meters high, branching from the base; branches rather slender, spreading, 12 to 14-ribbed, the ribs somewhat tuberculate; spines 10 to 14, acicular, 1 to 1.5 cm. long, brownish; flowering areoles on one side of the stem, developing white or yellowish hairs 5 cm. long; flowers light purple to purplish green; perianth segments fleshy, usually rounded at apex; ovary nearly naked.

13. Cephalocereus purpusii Britt. & Rose, Cactaceae 2: 56. 1920.
Sinaloa; type from Mazatlán.

Stems slender, 2 to 3 meters high, simple or more or less branched; branches green, erect, 3 to 4 cm. in diameter, usually simple; ribs 12, 5 to 6 mm. high, separated by narrow intervals; areoles closely set, 10 mm. apart or less on the lower part of the stem, but much closer toward the top, on the young growth with long silky white hairs, but on old parts without hairs; spines acicular, swollen at base, 1 to 3 cm. long, bright yellow at first, in age gray.

7. ESCONTRIA Rose, Contr. U. S. Nat. Herb. 10: 126. 1906.

The genus consists of a single species.

1. Escontria chiotilla (Weber) Rose, Contr. U. S. Nat. Herb. 10: 126. 1906.
Cereus chiotilla Weber; Schum. Gesamtb. Kakt. 83. 1897.
Puebla and elsewhere in southern Mexico.

Plant 4 to 7 meters high; trunk very short; branches numerous, forming a compact top, weak and easily broken, bright green, not at all glaucous; ribs 7 or 8, acute; areoles close together, often confluent, elliptic; radial spines 10 to 15, rather short, often reflexed; central spines several, one much longer than the others, somewhat flattened, sometimes 7 cm. long, all light-colored; flowers borne near the ends of the branches, including the ovary about 3 cm. long; inner perianth segments yellow, acuminate; scales on ovary and flower tube arranged in many overlapping series, ovate, 8 to 15 mm. long; fruit glabrous, about 5 cm. in diameter, scaly, edible. "Jiotilla," "chiotilla," "xiotilla."

The ripe fruit is edible and is sold in the markets. The fruit is sometimes preserved by drying.

8. **PACHYCEREUS** Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 420. 1909.

Usually very large plants, more or less branched, with definite trunks, the stems and branches stout, columnar, ribbed; flowers diurnal, with rather short tube; outer perianth segments short, spatulate; stamens included, numerous, inserted along the throat; style included; ovary and flower tube covered with small scales bearing felt and bristles in their axils; fruit large, burlike, dry, usually densely covered with clusters of deciduous spines and bristles; seeds large and black.

One other species is known, a native of Guatemala.

Wool of ovary areoles sparse, shorter than the coriaceous scales--**8. P. ruficeps.**
Wool of ovary areoles copious, mostly longer than the scales.
  Perianth tube narrow; branches 5 to 7-angled----------**7. P. marginatus.**
  Perianth tube broad; branches many-ribbed.
    Areoles of ovary and perianth tube bearing copious yellow-brown wool 1.5 to 2.5 cm. long----------**6. P. chrysomallus.**
    Areoles of ovary and perianth tube densely felted but without long wool.
      Joints, at least the young ones, glaucous, the bloom persistent as whitish streaks----------**5. P. grandis.**
      Joints green or but slightly glaucous.
        Upper areoles of the perianth tube, like the others, densely felted, the scales short.
          Spines brown to gray or sometimes black----------**1. P. pringlei.**
          Spines of young growth yellow-brown----------**2. P. orcuttii.**
        Upper areoles of the perianth tube little or scarcely felted, the scales long.
          Flowering areoles bearing many short weak spines. **3. P. pecten-aboriginum.**
          Flowering areoles bearing several stiff acicular spines-**4. P. gaumeri.**

1. **Pachycereus pringlei** (S. Wats.) Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 422. 1909.

Cereus pringlei S. Wats. Proc. Amer. Acad. **20**: 368. 1885.
Cereus calvus Engelm.; Coulter, Contr. U. S. Herb. **3**: 409. 1896.
Cereus titan Engelm.; Coulter, Contr. U. S. Nat. Herb. **3**: 409. 1896.

Sonora and Baja California; type from the Altar River, Sonora.

Treelike, up to 11 meters high, usually with a very short thick trunk, sometimes 1 or even 2 meters long or more, often 60 cm. in diameter or more; stem sometimes nearly simple but often with numerous thick upright branches, more or less glaucous, very spiny or in some forms nearly naked; ribs usually 11 to 15 but sometimes 17, obtuse; areoles, especially the flowering ones, very large, brown-felted, usually confluent or connected by a groove; spines on young growth 20 or more at an areole, 1 to 2 cm. long, white but with black tips, or on young plants sometimes 12 cm. long and black throughout; flower-bearing region of the branches extending from near the top downward sometimes for 2 meters, the areoles becoming broad and uniting, often spineless; flowers 6 to 8 cm. long, the tube and ovary bearing small acute scales, these nearly hidden by the mass of brown hairs produced in their axils; inner perianth segments white, broad, spreading; fruit globular, covered with brown felt and bristles, dry. "Cardón", "cardón pelón"; "saguesa" (Sonora).

This is an abundant and conspicuous plant in many parts of Sonora and Baja California, often forming extensive forests. The dried wood is employed for fuel, and the stems for building huts. The Indians grind the pulp and

seeds together into a kind of flour which is used for making tamales. For illustrations of this species see Contr. U. S. Nat. Herb. 16: *pl. 130, 131, 132.*

It is probably this plant which is described by Clavigero (Historia de la California, 1789) under the name "cardón." Among other notes, he remarks that "the missionaries found a method of utilizing the branches, for from a piece about two palms long they extracted by crushing the juice, which they boiled down, thus obtaining a balsam which is good for wounds and bruises."

2. **Pachycereus orcuttii** (K. Brandeg.) Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 422. 1909.

Cereus orcuttii K. Brandeg. Zoe **5**: 3. 1900.

Type from Rosario, Baja California.

Stems bright green, reaching a height of 3 meters and a diameter of 15 cm.; ribs 14 to 18, 1 cm. high; areoles 6 mm. in diameter, densely covered with light gray wool; spines all slender, yellowish brown; radials 12 to 20, 12 mm. long, the centrals about 5, porrect; flowers greenish brown, 4 cm. long, the inner perianth segments short-apiculate; ovary densely covered with short scales, almost concealed by thick tufts of yellowish wool, and furnished with dark brown bristles 4 to 6 cm. long.

3. **Pachycereus pecten-aboriginum** (Engelm.) Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 422. 1909.

Cereus pecten-aboriginum Engelm.; S. Wats. Proc. Amer. Acad. **21**: 429. 1886.

Chihuahua, Sonora, Baja California, and Colima; type from Hacienda San Miguel, Chihuahua.

Treelike, 5 to 10 meters high, with a trunk 1 to 2 meters high and 30 cm. in diameter, crowned with many erect branches; ribs 10 or 11; areoles 1 cm. in diameter or even less, extending downward in narrow grooves, in the flowering ones forming brownish cushions connecting with the areoles below, densely tomentose (grayish except in flowering ones, these brownish or reddish); spines 8 to 12, 1 to 3 central, all short, usually 1 cm. long or less, but in some cases 3 cm. long, grayish with black tips; flowering areoles not much larger than the others; flowers 5 to 7.5 cm. long; ovary covered with dense soft hairs with only a few bristles or none; outer perianth segments purple, succulent; inner ones white, fleshy; fruit 6 to 7.5 cm. in diameter, dry, covered with yellow wool and long yellow bristles. "Cardón," "cardón hecho," "cardón barbón" (Baja California); "hecho" (Chihuahua, Baja California).

The specific name was given in allusion to the fact that the Indians used the burlike fruits as combs. They also ground the seeds into meal and employed them in the preparation of cakes. For an illustration of this species see Contr. U. S. Nat. Herb. **16**: *pl. 132, B.*

4. **Pachycereus gaumeri** Britt. & Rose, Cactaceae **2**: 71. 1920.

Yucatán; type from Hodo.

Plant slender, 2 to 7 meters high, erect, simple or few-branched; branches 4-angled or winged; ribs thin, 3 to 4 cm. high; areoles large, 1 to 2.5 cm. apart, brown-felted; spines several, slender, 1 to 3 cm. long, brownish; flowers yellowish green, 5 cm. long; scales of ovary and flower tube more or less foliaceous, drying black and thin, with brown felt in the areoles; scales on ovary linear, puberulent.

5. **Pachycereus grandis** Rose, Contr. U. S. Nat. Herb. **12**: 421. 1909.

Cereus bergerianus Vaupel, Monatsschr. Kakteenk. **23**: 24. 1913.

Morelos, the type from Cuernavaca.

Plant 6 to 10 meters high, either simple or much branched, the trunk sometimes a meter in diameter; branches, when present, columnar, generally

simple, becoming erect almost from the first, with numerous constrictions, pale green or when young glaucous, with some bloom persisting in streaks; ribs 9 to 11, acutish, high; sterile areoles circular, large, bearing white felt and subulate spines, 2 to 3 cm. apart, not running together; old spines grayish to white with black tips; radial spines 9 or 10; central spines 3, the lower one longer, sometimes 6 cm. long, somewhat flattened; flowering areoles large, elliptic, bearing acicular or bristle-like spines; flowers about 4 cm. long; ovary and flower tube bearing small, acuminate scales, their axils filled with downy hairs; fruit large, globular, dry, covered with long yellow bristles and yellow felt.

6. **Pachycereus chrysomallus** (Lem.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 421. 1909.

Pilocereus chrysomallus Lem. Fl. Serr. Jard. 3: under *pl. 242*. 1847.

Cereus chrysomallus Hemsl. Biol. Centr. Amer. Bot. 1: 541. 1880.

Pilocereus fulviceps Weber; Schum. Gesamtb. Kakt. 176. 1897.

Puebla and Oaxaca.

Stem columnar, massive, at first simple, but in very old plants much branched, giving off hundreds of erect branches which form an almost compact cylinder up to 5 meters in diameter, becoming 12 to 18 meters high; branches glaucous green, 11 to 14-ribbed; flowering branches capped by dense masses of brownish wool; areoles approximate or even confluent; radial spines about 12, slender; centrals 3, 1 very long, sometimes 12 to 13 cm. long; flowers borne near the tops of the stems or branches, 6 to 7 cm. long, the bud, afterward the flower, and finally the fruit, completely concealed in the long wool; ovary covered with small pale, imbricate scales; flower tube also covered with imbricate scales, but these larger and pinkish, pointed; flower tube proper 10 mm. long or less; throat funnelform, 3 cm. long; inner perianth segments numerous, 1.5 to 3 cm. long, cream-colored.

7. **Pachycereus marginatus** (DC.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 421. 1909.

Cereus marginatus DC. Mém. Mus. Hist. Nat. 17: 116. 1828.

Cereus gemmatus Zucc.; Pfeiff. Enum. Cact. 96. 1837.

Hidalgo, Querétaro, and Guanajuato; also planted and naturalized in other parts of Mexico.

Stems 3 to 7 meters high, erect, usually simple; ribs 5 or 6 (7 in the original specimen), somewhat acute when young, obtuse in age; areoles close together, usually confluent, their wool forming a dense white cushion along the ridge of each rib; spines at first 5 to 8 (1 central), in old areoles more numerous, 1 cm. long or less, but in flowering areoles often numerous, bristly and 2 cm. long; flowers and fruit usually closely set, one above the other, apparently only one at an areole, but recorded as often geminate, and appearing anywhere along the ribs from the top downward; flower funnelform, 3 to 4 cm. long; tube and ovary more or less scurfy and with ovate scales subtending bunches of wool and small spines; fruit globular, about 4 cm. in diameter, not very fleshy, yellowish red within, covered with spines and wool which finally drop off; seeds numerous, black, somewhat shining, 4 mm. long. "Organo" (Durango, Oaxaca, San Luis Potosí); "jarritos" (flowers; San Luis Potosí).

Palmer reports that the flowers are sold in the markets of San Luis Potosí for the honey which they contain. This species, like many other cacti of similar habit, is much planted to form living fences. The straight trunks are placed closely side by side and form impenetrable barriers, which are characteristic features of Mexican towns.

8. **Pachycereus ruficeps** (Weber) Britt. & Rose, Cactaceae 2: 75. 1920.
Pilocereus ruficeps Weber; Goss. Bull. Mus. Hist. Nat. 11. 509. 1905.
Cereus ruficeps Vaupel, Monatsschr. Kakteenk. 23: 27. 1913.
Oaxaca and Puelba; type from Tehuacán, Puebla.

Stout, columnar, 15 meters high, from a simple trunk, 30 to 40 cm. in diameter, but branched above; ribs about 26; young spines reddish; radial spines 8 to 10, about 1 cm. long, rigid, grayish; central spines 1 to 3, the longest 4 to 5 cm. long, porrect or deflexed; flowers at the top of the plant, campanulate, 5 cm. long, the ovary and tube bearing small chartaceous scales, these with small tufts of felt and a few yellow bristles in their axils; fruit small, not edible; seeds small, brownish, shining.

9. **Pachycereus columna-trajani** (Karw.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 421. 1909.
Cereus columna-trajani Karw.; Pfeiff. Enum. Cact. 76. 1837.
Pilocereus lateribarbatus Pfeiff.; Först. Handb. Cact. ed. 2. 672. 1885.
Puebla and Oaxaca; type from San Sebastián, Puebla.

Plants erect, stout, up to 15 meters high, 45 to 50 cm. in diameter, often simple; ribs many, green; areoles oblong, bearing brown felt; radial spines 8 to 10, 12 to 25 mm. long; central spines more elongate, sometimes 16 cm. long, deflexed; spines all rigid, white or horn-colored except the brown bases and tips, sometimes said to be soft and erect; flowers described as purple. "Tetetza" (Oaxaca, *Conzatti*).

DOUBTFUL SPECIES.

CEREUS TETAZO Coulter, Contr. U. S. Nat. Herb. 3: 409. 1896. *Pilocereus tetetzo* Weber; Schum. Gesamtb. Kakt. 175. 1897. Described from Jalisco. This species has been referred to the present group, but the ovary is glabrous, and the fruit fleshy and edible. It should be compared with *Cephalocereus macrocephalus*. The names "tetetzo," "tetazo," "cabeza de viejo," and "tetecho" are reported for it. The fruits, known as "higos de tetetzo," are edible, and are sometimes preserved by drying, and the flowers are said to be eaten in salads.

9. **LEMAIREOCEREUS** Britt. & Rose, Contr. U. S. Nat. Herb. 12: 424. 1909.

Plants usually large, tall, and branching, but rarely low, nearly prostrate, simple, forming thickets; areoles rather large, felted; spines usually stout and numerous; flowers diurnal or in some species nocturnal, one at an areole, tubular-funnelform or campanulate, the short tube tardily separating with the style from top of the ovary; stamens numerous, borne in many rows all along the inner surface of the throat; ovary more or less tubercled, bearing scales felted in the axils, the areoles at first spineless or nearly so, soon developing a cluster of spines; fruit globular to oval, often edible, irregularly bursting when old, exposing the seeds, at first very spiny, but when ripe the spines often deciduous; seeds many, black.

About 10 other species are known, widely distributed in tropical America.

Ribs 5 to 7, separated by broad shallow intervals._____11. L. dumortieri.
Ribs 6 to 20, separated by deep intervals.
Areoles with white, brown, or gray felt, not glandular.
Spines very stout, at first reddish brown or nearly black____7. L. weberi.
Spines slender, acicular to subulate.
Ribs about 20_____6. L. treleasei.

Ribs 6 to 12.
Areoles borne on ribs, when these are crenate borne on elevations.
Joints green, not glaucous----1. L. hollianus.
Joints glaucous when young, the bloom persistent as whitish streaks----2. L. pruinosus.
Areoles borne in depressions of the crenate ribs.
Plants bright green.
Ribs 9 to 12; flowers greenish yellow----3. L. chichipe.
Ribs 7 to 9; flowers rose-colored----4. L. chende.
Plants glaucous----5. L. stellatus.
Areoles with dark brown or black felt, glandular.
Ribs 6 to 8.
Scales of the ovary 2 mm. long or less----8. L. queretaroensis.
Scales of the ovary 4 to 6 mm. long----9. L. montanus.
Ribs 12 to 17----10. L. thurberi.

1. **Lemaireocereus hollianus** (Weber) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 425. 1909.

Cereus hollianus Weber; Coulter, Contr. U. S. Nat. Herb. 3: 411. 1896.
Cereus bavosus Weber; Schum. Gesamtb. Kakt. 84. 1897.
Puebla, the type from Tehuacán.

Stem simple or branching only at base, 4 to 5 meters high; ribs 8 to 12, acute; areoles 1 to 3 cm. apart; spines at first bright red, but soon gray; radial spines about 12, very unequal, 1 to 3 cm. long, mostly spreading; centrals 3 to 5, swollen at base, unequal, the lower much longer than the others, sometimes 10 cm. long, strongly deflexed; flowers borne at the upper areoles, 10 cm. long, white; scales on ovary and flower tube with lanate and bristly axils; fruit "as large as a goose egg," dark purple to red, covered with clusters of spines and bristles; seeds black, shining.

Cereus brachiatus Galeotti (Salm-Dyck, Cact. Hort. Dyck. 1849. 195. 1850) must be very close to *L. hollianus* if not identical.

2. **Lemaireocereus pruinosus** (Otto) Britt. & Rose, Cactaceae 2: 88. 1920.

Echinocactus pruinosus Otto; Pfeiff. Enum. Cact. 54. 1837.
Cereus pruinosus Otto; Först. Handb. Cact. 398. 1846.
Cereus laevigatus Salm-Dyck, Cact. Hort. Dyck. 1849. 204. 1850.
Oaxaca and elsewhere in south-central Mexico.

Plant usually tall, with a more or less definite trunk; ribs 5 or 6, very high, separated by broad intervals; spines few, the radial ones 5 to 7, brownish; central spine solitary, 3 cm. long; flowering areoles large, brown-felted; flowers about 9 cm. long; upper scales and outer perianth segments 1 cm. long or less, rounded at apex; inner perianth segments longer and thinner than the outer ones; ovary with numerous brown-felted areoles; fruit ovoid, spiny, 6 to 7 cm. long.

3. **Lemaireocereus chichipe** (Goss.) Britt. & Rose, Cactaceae 2: 89. 1920.

Cereus chichipe Goss. Bull. Mus. Hist. Nat. 11: 507. 1905.
Cereus mixtecensis Purpus, Monatsschr. Kakteenk. 19: 52. 1909.
Puebla and Oaxaca; type from Cerro Colorado, near Tehuacán, Puebla.

Treelike, up to 5 meters high, with a short trunk 80 to 100 cm. in diameter and a large, much branched top; branches 9 to 12-ribbed, the ribs undulate, acutish, 2 cm. high; areoles 1 to 1.5 cm. apart; radial spines 6 or 7, 5 to 10 cm. long, grayish; central spine 1; flowers small, yellowish green; fruit spiny, globose, 2 to 2.5 cm. in diameter, red both within and without; seeds small, black. "Chichipe," "chichibe"; "chichituna" (fruit).

The fruit is edible, and is sold in the markets.

4. **Lemaireocereus chende** (Goss.) Britt. & Rose, Cactaceae **2**: 90. 1920.

Cereus chende Goss. Bull. Mus. Hist. Nat. **11**: 506. 1905.

Cereus delmoralii Purpus, Monatsschr. Kakteenk. **19**: 89. 1909.

Puebla and Oaxaca; type from Cerro Colorado, near Tehuacán, Puebla.

Plant 5 to 7 meters high, with a short indefinite trunk, very much branched above, forming a large top; branches rather slender, ascending or erect; ribs 7 to 9, rather sharp, areoles on old branches 1.5 cm. apart, on young branches perhaps closer together, radial spines usually 5, the centrals when present a little longer than the radials, brown to bright yellow, in age grayish, acicular; flowers 3 to 4 cm. long; fruit said to be deep red, very spiny. "Chende," "chente," "chinoa."

5. **Lemaireocereus stellatus** (Pfeiff.) Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 426. 1909.

Cereus stellatus Pfeiff. Allg. Gartenz. **4**: 258. 1836.

Cereus dyckii Mart.; Pfeiff. Enum. Cact. 87. 1837.

Cereus tonelianus Lem. Illustr. Hort. Lem. **2**: Misc. 63. 1855.

Stenocereus stellatus Riccobono, Boll. Ort. Bot. Palermo **8**: 253. 1909.

Oaxaca and elsewhere in southern Mexico.

Plant 2 to 3 meters high, branching at base, rarely branching above, pale bluish green; ribs 8 to 12, low, obtuse; radial spines 10 to 12; centrals several, often much longer than the others, sometimes 5 to 6 cm. long; areoles 1 to 2 cm. apart; flowers appearing at or near the top of the plant, red, narrowly campanulate, about 4 cm. long; ovary bearing small scales subtending wool and bristly spines; fruit red, spiny, globular, about 3 cm. in diameter; spines deciduous; seeds dull, pitted. "Tuna," "joconostle."

6. **Lemaireocereus treleasei** (Vaupel) Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 426. 1909.

Cereus treleasei Vaupel, Monatsschr. Kakteenk. **23**: 37. 1913.

Oaxaca; type collected between Mitla and Oaxaca.

Plant 5 to 7 meters high, simple or with a few strict branches; ribs about 20; areoles approximate with a peculiar V-shaped depression just above each one; spines rather short, yellowish; flowers pinkish, 4 to 5 cm. long, diurnal; scales on ovary and flower tube subtending slender whitish bristles; fruit red, about 5 cm. in diameter, covered with clusters of deciduous spines; seeds black, dull, rugose. "Tunillo."

7. **Lemaireocereus weberi** (Coulter) Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 426. 1909.

Cereus weberi Coulter, Contr. U. S. Nat. Herb. **3**: 410. 1896.

Cereus candelabrum Weber; Schum. Gesamtb. Kakt. 106. 1897.

Puebla and Oaxaca; type collected near Tehuacán, Puebla.

Plant very large, 10 meters high or more, with a trunk short but thick and often with hundreds of nearly erect branches rising from near the base, dark bluish green, slightly glaucous; ribs usually 10, rounded; areoles large; radial spines usually 6 to 12, spreading, more or less acicular, 1 to 2 cm. long; central spine usually up to 10 cm. long, solitary, flattened, often more or less deflexed, except in the upper areoles, at first brown to blackish, much longer than the laterals; areoles white-felted; flowers 8 to 10 cm. long; scales on flower tube narrow, thin, bearing long brown hairs in their axils; inner perianth segments oblong, 2 cm. long; ovary globular, covered by the dense brown felt of its areoles; fruit oblong, edible, 6 to 7 cm. long, very spiny, the spine clusters deciduous in ripening.

Alcocer reports that the seeds are sold in the markets of Tehuacán, to be ground and mixed in tortillas

8. Lemaireocereus queretaroensis (Weber) Safford, Ann. Rept. Smiths. Inst. 1908: *pl. 6, f. 2.* 1909.

Cereus queretaroensis Weber; Mathsson, Monatsschr. Kakteenk. 1: 27. 1891.

Guanajuato, Querétaro, and Jalisco; type from Querétaro.

Plant 3 to 5 meters high, with a short woody trunk, much branched above; ribs 6 to 8, prominent, obtuse; areoles about 1 cm. apart, large, brown-woolly, very glandular; spines 6 to 10, at first red, becoming grayish in age, acicular, rather unequal, sometimes only 15 mm. long, at other times 5 cm. long; flowers 7 to 8 cm. long; ovary with many woolly areoles subtended by ovate scales 2 mm. long or less; fruit spiny, edible. "Pitahaya."

9. Lemaireocereus montanus Britt. & Rose, Cactaceae 2: 97. 1920.

Type from Alamos, Sonora.

Treelike, 6 to 7 meters high, with a definite smooth trunk 1 meter long or more, with few branches, at first spreading, then nearly erect; ribs usually 8, prominent; areoles 1 to 1.5 cm. apart, large, filled with short brown wool; spines 6 or less, pale, rather stout, one of them longer, sometimes 3 cm. long; flowers 6 to 7 cm. long, opening during the day; outer perianth segments purplish; scales on ovary ovate, 4 to 6 mm. long, imbricate, acuminate, with erose margins.

10. Lemaireocereus thurberi (Engelm.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 426. 1909.

Cereus thurberi Engelm. Amer. Journ. Sci. 17: 234. 1854.

Sonora and Baja California; type collected in a canyon near the mountain pass of Bachuachi, Sonora. Arizona.

Usually without a definite trunk, sending up from the base 5 to 20, or even more, erect or ascending branches 3 to 7 meters high, 15 to 20 cm. in diameter, the basal ones usually simple but occasionally with lateral branches; ribs 12 to 17, rather low, sometimes 2 cm. high, rounded, separated by narrow intervals; areoles 10 to 15 or rarely 30 mm. apart, sometimes becoming 1 cm. in diameter, circular, brown-felted, more or less glandular, the whole areole becoming a waxlike mass; spines numerous, acicular to subulate, unequal, brownish to black, becoming gray in age, the longest sometimes 5 cm. long; flowers mostly borne near the top of the stem but sometimes 30 cm. below the top, 6 to 7.5 cm. long; outer perianth segments broad, reddish, imbricate, gradually passing into the scales on the tube; inner perianth segments light purple with nearly white margins, widely spreading or even turned back at apex, broad, obtuse; ovary tuberculate, bearing small ovate acute scales, these with white and brown hairs in their axils; fruit globular, 4 to 7.5 cm. in diameter, edible, very spiny, but in age naked, olive without, crimson within; seeds black, shining, 1.8 to 2 mm. long. "Pitahaya," "pitahaya dulce."

The dried stems are often used for fuel. The agreeably flavored fruit is gathered in large quantities, and sweetmeats are sometimes made from it. For an illustration of the plant see Contr. U. S. Nat. Herb. 16: *pl. 125, A.*

It is doubtless this species of which Clavigero (Historia de la California, 1789) writes as follows: "Nowhere is the *pitahayo* so luxuriant as in California * * * Underneath the bark there is about a finger's breadth of green and very juicy pulp, and within that a woody tube full of whitish pith which, when dry, burns well and is used for torches for giving light. Toward the ends of the branches spring forth beautiful white flowers, spotted with bright red, but without odor, and these are followed by the fruits, called *pitahayas* by the Spaniards, and *tammiá* or *dammiá* by the Cochimí of Cali-

fornia. This fruit is round, of the size of a large peach, and is also armed with spines; at first it is green, but when ripe it turns red or yellow. That with red rind has pulp of a beautiful blood-red color, and that with yellow rind has white or yellow pulp. The rind is rather thick but soft and easily separated, and the pulp is sweet, mild, refrigerant, and wholesome. After the rind is removed the pulp is eaten, along with the seeds, with which it is filled, which are somewhat like those of the fig, although smaller. The red pitahayas color the urine like blood, for which reason some strangers who have eaten them have been much alarmed, thinking that they have broken a blood vessel. In the southern part of the peninsula the harvest of the sweet pitahayas begins the first of June, and ends the last of August; in the northern part it begins later and is most abundant in August; but when there is a little more rain than usual the harvest is very scant or none at all, for there is no plant so much injured by dampness as the pitahayo. For harvesting, the Californians use a stick to one end of which is firmly attached a slender hook-shaped bone, for pulling off the fruit, and a net in which to catch it without letting it fall on the ground. After it is gathered, they take off the spines with a little stick, which is easily done if the fruit is ripe, and then they peel and eat it; and in this way they go about gathering and eating until filled, and what is left they take home. During the time of the harvest the people go all day long over the mountains and plains hunting for ripe pitahayas, and for them, as we shall see later, this is the happiest season of the year."

11. Lemaireocereus dumortieri (Scheidw.) Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 425. 1909.

Cereus dumortieri Scheidw. Hort. Belg. 4: 220. 1837.

Morelos and Hidalgo and elsewhere in central Mexico.

Often treelike, 6 to 15 meters high, the trunk proper short, 60 to 100 cm. long, 30 cm. in diameter or more, woody; branches many, erect almost from the first, with numerous constrictions, very pale bluish green or somewhat glaucous; ribs generally 6, sometimes 5 or 7, occasionally 9 on very old joints; areoles elliptic, approximate or often confluent, gray-felted; spines various in number and in length, 10 to 20 radials, 1 central or more, the longer ones often 4 cm. long, all at first straw-colored but in age blackened; flowers 5 cm. long, the tube and ovary bearing small ovate scales with bunches of felt and occasionally bristles in their axils, the limb about 2.5 cm. broad; fruit oblong, 3 to 4 cm. long, reddish within, not spiny, its areoles nearly contiguous, felted; seeds brownish, 1.5 mm. long, dull, roughened.

Cereus anisacanthus DC. (Mém. Mus. Hist. Nat. **17**: 116. 1828) is doubtfully referred here by Schumann.

DOUBTFUL SPECIES.

CEREUS CONFORMIS Salm-Dyck, Cact. Hort. Dyck. 1849. 203. 1850. Type from Mexico.

CEREUS RIGIDISPINUS Monville, Hort. Univ. **1**: 223. 1840. Type from Mexico. Both this and the preceding probably represent species of *Lemaireocereus*.

10. BERGEROCACTUS Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 435. 1909.

The genus consists of a single species.

1. Bergerocactus emoryi (Engelm.) Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 435. 1909.

Cereus emoryi Engelm. Amer. Journ. Sci. II. **14**: 338. 1852.

Northern Baja California and on the adjacent islands. California.

Branches 20 to 60 cm. long, 3 to 6 cm. in diameter, entirely covered with the dense spiny armament; ribs 20 to 25, very low, only a few millimeters high,

somewhat tuberculate; spines 10 to 30, yellow to yellowish brown, acicular, 1 to 4 cm. long; flowers about 2 cm. long and about as broad when expanded; outer perianth segments obovate, obtuse; inner perianth segments oblong, about 1 cm. long; fruit globose, densely spiny.

11. WILCOXIA Britt. & Rose, Contr. U. S. Nat. Herb. 12: 434. 1909.

Plants usually low and weak, producing a cluster of dahlia-like roots; stems very slender, more or less branched, the branches often only the diameter of a lead pencil; ribs few and low; spines of all the areoles similar; flowers diurnal, funnelform-campanulate, red or purple, large for the size of the plant, only 1 from an areole, the tube rather short, its areoles bearing spines or bristles and wool; areoles of ovary and fruit bearing spines or bristles and wool; seeds black, the aril large and basal.

The following are all the known species.

Areoles on ovary and flower tube bearing long bristles.
- Stems puberulent---------- **1. W. viperina.**
- Stems glabrous.
  - Corolla about 5 cm. long; tube indefinite; seeds dull; spine clusters 3 to 5 mm. apart---------- **2. W. poselgeri.**
  - Corolla 10 to 12 cm. long; tube definite; seeds shining; spine clusters distant---------- **3. W. striata.**

Areoles on ovary and lower part of flower tube without long bristles. **4. W. papillosa.**

1. Wilcoxia viperina (Weber) Britt. & Rose, Contr. U. S. Nat. Herb. 16: 242. 1913.

Cereus viperinus Weber; Goss. Bull. Mus. Hist. Nat. **10**: 385. 1904.

Puebla; type from Zapotitlán.

Stems elongate, branching, the largest ones 1 cm. in diameter, becoming spineless; branches densely velvety-puberulent, 8 mm. in diameter or less; ribs about 8, inconspicuous; spines about 8, appressed, dark, about 5 mm. long; flowers red, 3 cm. long; spines of ovary and corolla tube black, bristle-like, intermixed with long white wool. "Organito de víbora."

2. Wilcoxia poselgeri (Lem.) Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 434. 1909.

Cereus tuberosus Poselger, Allg. Gartenz. **21**: 135. 1853. Not *C. tuberosus* Pfeiff. 1837.

Echinocereus poselgeri Lem. Cact. 57. 1868.

Cereus poselgeri Coulter, Contr. U. S. Nat. Herb. **3**: 398. 1896.

Coahuila. Southern Texas.

Roots tuberous, black, several, near the surface of the ground; stems 60 cm. high or less, 6 to 10 mm. thick, with 8 to 10 inconspicuous ribs, the lower and older parts naked, spiny above, the spines almost hiding the ribs; radial spines 9 to 12, appressed, 3 to 5 mm. long, delicate, puberulent; central one ascending, black-tipped, about 1 cm. long, stouter than the radials; flowers purple or pink, 5 cm. long; spines of ovary and flower tube intermixed with white hairs; perianth segments linear, acuminate, about 2.5 cm. long, widely spreading or strongly recurved; seeds pitted or rugose, 8 mm. long. "Sacasil."

3. Wilcoxia striata (T. S. Brandeg.) Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 434. 1909.

Cereus striatus T. S. Brandeg. Zoe **2**: 19. 1891.

Cereus diguetii Weber, Bull. Mus. Hist. Nat. **1**: 319. 1895.

Baja California and Sonora; type from San José del Cabo, Baja California.

Roots brown, shallow-seated; stem vinelike, very slender, usually with 9 indistinct ribs, grayish; spines about 9, 1.5 to 3 mm. long, acicular, weak, appressed, brownish, the areoles rather distant; flowers 10 to 12 cm. long, purple, the areoles bearing slender bristle-like spines and long wool; fruit pyriform, 3 to 4 cm. long, scarlet, spiny, the spines deciduous; seeds minutely pitted. "Pitahayita," "sacamatraca," "saramatraca," "jarramatraca," "racamatraca."

A cloth saturated with the juice of the crushed roots is sometimes applied to the chest to relieve inflammation of the lungs.

4. **Wilcoxia papillosa** Britt. & Rose, Cactaceae **2**: 112. 1920.

Sinaloa, the type from Culiacán.

Tap-root spindle-shaped, fleshy, 4 to 7 cm. long, 2 cm. in diameter, giving off long fibrous roots; stems slender, with few branches, 30 to 40 cm. long, perhaps longer, 3 to 5 mm. in diameter, glabrous, but the whole surface covered with minute papillae; ribs low, indistinct, perhaps 3 to 5; areoles small, distant, 1 to 3 cm long, white-woolly; spines in clusters of 6 to 8, minute, yellowish brown, bulbose at base, 1 to 3 mm. long; flowers scarlet, 4 to 5 cm. long; scales on ovary and flower tube small, linear-cuspidate, those at the top of the tube with long white wool and several brown bristles in their axils; perianth segments 2 cm. long. "Cardoncillo."

12. PENIOCEREUS Britt. & Rose, Contr. U. S. Nat. Herb. 12: 428. 1909.

Plants low, slender, from an enormous fleshy turnip-shaped root; stems and branches usually 4 or 5-angled; spines of all the areoles similar; flowers very large, funnelform, nocturnal, white, the outer segments tinged with red; tube of flower long, slender, with long hairs in the axils of the upper scales, but with clusters of spines on the lower part and also on the ovary; fruit spiny, ovoid, long-pointed, bright red, fleshy; seeds black, rugose.

The genus consists of two species.

Young growth pubescent; seeds dull black ..... **1. P. greggii.**
Young growth glabrous; seeds shining ..... **2. P. johnstonii.**

1. **Peniocereus greggii** (Engelm.) Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 428. 1909.

Cereus greggii Engelm. in Wisliz. Mem. North. Mex. 102. 1848.

Cereus pottsii Salm-Dyck, Cact. Hort. Dyck. 1849. 208. 1850.

Sonora, Chihuahua, and Zacatecas; type collected near the city of Chihuahua. Western Texas to Arizona.

Root often very large, sometimes 60 cm. in diameter, weighing 60 to 125 pounds, usually 15 to 20 cm. long by 5 to 8 cm. in diameter; stems 30 cm. to 3 meters high, 2 to 2.5 cm. in diameter, the young parts pubescent; spines small, blackish; radials 6 to 9; central usually 1, sometimes 2; flower 15 to 20 cm. long, the tube slender and terminating in a short funnelform throat, covered with stamens; inner perianth segments lanceolate, acute, 4 cm. long, spreading, or the outer ones reflexed; filaments erect, exserted; style slender, the stigma lobes about 1 cm. long; fruit tuberculate, 12 to 15 cm. long, including the elongate beak. "Huevo de venado" (*Patoni*).

2. **Peniocereus johnstonii** Britt. & Rose, Journ. Washington Acad. Sci. **12**: 329. *f. 2.* 1922.

Baja California, the type from San Josef Island.

Plant climbing or clambering, up to 3 meters long; stems and branches 3 to 5-angled; spines 9 to 12, brown to black; upper radial spines short, stubby, swollen at base, nearly black, the two lower light brown, elongate, bristle-like

reflexed; central spines 1 to 3, subulate, 4 to 8 mm. long; flower 15 cm. long, the segments about 3 cm. long, the tube slender, with prominent areoles on knobby projections; fruit 6 cm. long, bearing prominent clusters of black spines.

13. MACHAEROCEREUS Britt. & Rose, Cactaceae 2: 114. 1920.

Plants prostrate or low and bushy, often with long, horizontal or prostrate, stout branches, very spiny throughout; ribs low; areoles large, felted, spiny; spines numerous, the centrals flattened and dagger-like; flowers diurnal, 1 at an areole, long, slender, funnelform, the perianth persisting on the fruit; stamens numerous, borne on the narrow elongate throat; ovary and lower part of flower tube bearing many small scales, these subtending felted areoles which afterward bear clusters of spines; fruit globular, edible when young, covered with clusters of spines, but when fully mature becoming naked; seeds dull black, somewhat punctate, acute on the back.

Only two species are known.

Plants prostrate, the tips ascending; flowers yellow----------1. **M. eruca.**
Plants erect, 1 meter high or less, bushy; flowers purple----2. **M. gummosus.**

1. **Machaerocereus eruca** (T. S. Brandeg.) Britt. & Rose, Cactaceae 2: 115. 1920.

Cereus eruca T. S. Brandeg. Proc. Calif. Acad. II. 2: 163. 1889.

Baja California; type from Magdalena Island.

Prostrate, except the erect or ascending tips; branches 1 to 3 meters long, 4 to 8 cm. in diameter, usually simple, rooting on the under surface, dying at the older end and growing forward at the other; sometimes several plants starting as branches from a common parent as a center and first radiating out, then dying at the rear; ribs about 12; areoles large, 2 cm. apart; spines about 20, very unequal, pale gray, the outer ones terete, the inner stout and flatter, the longest about 3 cm. long; flowers 10 to 12 cm. long; tube about 10 cm. long, nearly 6 mm. in diameter; limb 4 to 6 cm. broad; ovary very spiny; fruit spiny, 4 cm. long; seeds black. "Chilenola," "chirinole."

2. **Machaerocereus gummosus** (Engelm.) Britt. & Rose, Cactaceae 2: 116. 1920.

Cereus gummosus Engelm.; T. S. Brandeg. Proc. Calif. Acad. II. 2: 162. 1889.
Cereus cumengei Weber, Bull. Mus. Hist. Nat. 1: 317. 1895.
Cereus flexuosus Engelm.; Coulter, Contr. U. S. Nat. Herb. 3: 411. 1896.

Baja California and on the adjacent islands.

Erect or ascending, but usually not a meter high, or with long, spreading, sometimes prostrate branches, the whole plant sometimes having a spread of 6 to 7 meters; branches 4 to 6 cm. in diameter; ribs usually 8, rarely 9, low and obtuse; areoles rather large, about 2 cm. apart; spines stout, the radials 8 to 12, somewhat unequal, about 1 cm. long; central spines 3 to 6, stout, flattened, one much longer than the others and about 4 cm. long; flowers 10 to 14 cm. long, the tube long and slender; inner perianth segments 2 to 2.5 cm. long, purple; fruit subglobose, 6 to 8 cm. in diameter, spiny; skin of fruit bright scarlet; pulp purple; seeds rugose, pitted, 2.5 mm. long. "Pitahaya," "pitahaya agria."

The fruit is agreeably acid, and is much eaten. The crushed stems are sometimes thrown in water to stupefy fish. For an illustration of the plant see Contr. U. S. Nat. Herb. 16: *pl. 126A.*

It is apparently of this species that Clavigero writes as follows: "After the harvest of the sweet pitahaya [*Lemaireocereus thurberi*] follows that

of the sour one, called *tajuá* by the Cochimí, and this lasts through September and October or, if the season is favorable, even into November. The branches of this plant also are ridged, spiny, and without leaves, but the ridges are more ordinary and the spines larger, denser, and stouter. The branches are straight and parallel like those of the *tammiá* or sweet pitahayo; but from the trunk they take different directions, without any order or symmetry and, stretching over the ground, they throw out roots and form new plants; interlacing with each other, there result thickets which are unpleasant to look at and impenetrable by animals. The plant differs from the first kind also in the places in which it grows; for that fruits well anywhere in the mountains or on the plains, provided it is dry, while this is found only on the plains near the coast, and if plants are found occasionally in the mountains they are always sterile."

14. **NYCTOCEREUS** Britt. & Rose, Contr. U. S. Nat. Herb. 12: 423. 1909.

Erect or clambering, slender, sparingly branched cacti, with cylindric ribbed stems and branches; ribs numerous, low; areoles each bearing a tuft of short white wool and small radiating acicular bristles or weak spines; flowers large, white, nocturnal; ovary bearing small scales, short or long wool, and tufts of weak spines or bristles; perianth funnelform, gradually expanding above, bearing scales and tufts of weak bristles below the middle, above the middle bearing narrowly lanceolate scales distant from each other and grading into the blunt outer perianth segments; inner perianth segments widely spreading, obtuse or acutish; stamens numerous, shorter than the perianth; style about as long as the stamens; fruit fleshy, scaly, spiny or bristly; seeds large, black.

Three other species are known, natives of Central America.

Flower tube longer than the limb_____1. N. serpentinus.
Flower tube not longer than the limb_____2. N. oaxacensis.

1. **Nyctocereus serpentinus** (Lag. & Rodr.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 423. 1909.

Cactus serpentinus Lag. & Rodr. Anal. Cienc. Nat. Madrid 4: 261. 1801.
Cactus ambiguus Bonpl. Descr. Pl. Rar. 90. 1813.
Cereus serpentinus DC. Prodr. 3: 467. 1828.
Cereus ambiguus DC. Prodr. 3: 467. 1828.
Cereus splendens Salm-Dyck, Cact. Hort. Dyck. 1849. 214. 1850.

Mexico, probably native near the eastern coast.

Stems growing in a cluster or clump, at first erect, then clambering through bushes or over walls or, when without support, creeping or hanging, often 3 meters long, 2 to 5 cm. in diameter; ribs 10 to 13, low and rounded; areoles close together, felted and with acicular or bristle-like spines; spines about 12, white to brownish, the tips usually darker, the longest about 3 cm. long; flowers borne at the upper areoles, sometimes terminal, 15 to 19 cm. long, the limb 8 cm. broad; areoles on ovary and flower tube bristly; inner perianth segments white, spatulate, obtuse; fruit red, covered with deciduous spines, 4 cm. long; seeds black, 5 mm. long. "Junco espinoso" (Jalisco, Oaxaca); "gigante" (Durango); "reina de la noche."

This species is commonly cultivated for ornament in Mexico and is often found half wild about houses and in hedges. It is supposed to be a native, but has not been found really wild in recent years.

2. Nyctocereus oaxacensis Britt. & Rose, Cactaceae 2: 120. 1920.

Oaxaca; type from Lagunas, at 255 meters.

Stems branching, slender, 2 to 3 cm. in diameter; ribs 7 to 10, rather low; areoles 10 mm. apart; radial spines 8 to 12, 4 to 15 mm. long, slender, brownish; centrals 3 to 5; flowers 8 to 10 cm. long, "whitish inside, dirty purplish or reddish outside"; perianth segments linear to oblong, rounded at apex; ovary densely covered with brownish bristly spines.

15. **ACANTHOCEREUS** Britt. & Rose, Contr. U. S. Nat. Herb. 12: 432. 1909.

Weak elongate many-jointed cacti, at first erect but soon clambering or trailing, the joints usually strongly 3-angled, sometimes 4 or 5-angled, in one species sometimes 7-angled, the seedlings and juvenile branches not as strongly angled, with more ribs and with different spines; areoles bearing short wool or felt and several stiff spines; flowers funnelform, nocturnal, 1 at an areole; flower tube remaining rigid after anthesis, gradually drying and remaining on the ripe fruit, green, rather slender, expanded toward the summit, bearing a few areoles similar to those of the branches subtended by small scales; limb somewhat shorter than the tube, widely expanded; outer perianth segments narrowly lanceolate to linear, acuminate, green, shorter than the white inner segments; fruit spiny or naked, with a thick, dark red skin breaking irregularly from top downward; flesh red; seeds numerous, black.

Three other species are known, natives of Central and South America.

Ribs usually 3, rarely 4, thick.

Joints 8 to 10 cm. wide, deeply crenate; spines very stout, subulate.

1. A. horridus.

Joints 2 to 8 cm. wide, low-crenate; spines slender.

Spines well developed, subulate----------**2. A. pentagonus.**

Spines short or none, when present acicular----------**3. A. subinermis.**

Ribs 3 to 5, thin----------**4. A. occidentalis.**

1. Acanthocereus horridus Britt. & Rose, Cactaceae 2: 122. 1920.

Oaxaca. Guatemala.

Plants stout, the joints strongly 3-angled or 3-winged, the young growth 5 or 6-angled; areoles large, 3 to 6 cm. apart; spines brown or blackish when young; radial spines 1 to 6, very short, conic, less than 1 cm. long; central spine usually 1, sometimes 2, often very stout and elongate, sometimes 8 cm. long; flower 18 to 20 cm. long; tube 4 cm. long, including the funnelform throat 12 cm. long; throat 4 cm. broad at mouth; outer perianth segments linear, brown or greenish, 6 cm. long; inner perianth segments 3 to 4 cm. long; stamens white; fruit 3.5 cm. long, light red, glossy, covered with large areoles bearing white felt; skin thick, finally splitting; pulp red.

2. Acanthocereus pentagonus (L.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 432. 1909.

Cactus pentagonus L. Sp. Pl. 467. 1753.

Cactus pitajaya Jacq. Enum. Pl. Carib. 23. 1761.

Cereus pentagonus Haw. Syn. Pl. Succ. 180. 1812.

Cactus prismaticus Willd. Enum. Pl. Suppl. 32. 1813.

Cereus prismaticus Haw. Suppl. Pl. Succ. 77. 1819.

Cereus pitajaya DC. Prodr. 3: 466. 1828.

?*Cereus undulatus* DC. Prodr. 3: 467. 1828.

Cereus acutangulus Otto; Pfeiff. Enum. Cact. 107. 1837.

Cereus princeps Pfeiff. Enum. Cact. 108. 1837.
Cereus ramosus Karw.; Pfeiff. Enum. Cact. 108. 1837.
Cereus baxaniensis Karw.; Pfeiff. Enum. Cact. 109. 1837.
Cereus nitidus Salm-Dyck, Cact. Hort. Dyck. 1849. 211. 1850.
Cereus sirul Weber; Goss. Bull. Mus. Hist. Nat. 10: 384. 1904.

Eastern coast of Mexico. Texas, Central America, northern South America, and Guadeloupe.

Stem clambering, usually 2 to 3 or sometimes 7 meters high, but when growing in the open more or less arched and rooting at the tip, then making other arches and thus forming large colonies; old trunk becoming nearly round, 5 cm. in diameter or more; joints 3 to 8 cm. broad, 3 to 5-angled, low-crenate; juvenile growth nearly terete, with 6 to 8 low ribs, approximate areoles, and numerous short acicular spines; areoles on normal branches 3 to 5 cm. apart; spines acicular or gray, subulate; radials at first 6 or 7, 1 to 4 cm. long; central spine often solitary, longer than the radials; spines of old areoles often as many as 12, of which several are centrals; flowers 14 to 20 cm. long; tube and ovary bearing conspicuous areoles with brown felt and several subulate spines; outer perianth segments green; inner perianth segments white, acuminate; fruit oblong, red, edible; cotyledons broadly ovate, 5 to 8 mm. long, thick, united at base, gradually passing below into the spindle-shaped hypocotyl. "Pitahaya," "pitahaya naranjada," "pitahaya morada."[1]

3. Acanthocereus subinermis Britt. & Rose, Cactaceae 2: 125. 1920.

Type collected between Mitla and Oaxaca, State of Oaxaca.

Plants 1 meter high or higher; joints stout, 5 to 7 cm. broad, strongly 3 or 4-angled, bright green, somewhat shining, usually short; areoles 3 to 4 cm. apart; spines either wanting or short, when present 6 to 10 at an areole, acicular, usually less than 1.5 cm. long; flowers 15 to 22 cm. long; outer perianth segments narrow, reddish, acute; inner perianth segments white; areoles of ovary and flower tube somewhat spiny; fruit globular to short-oblong, 4 cm. long, dull red.

4. Acanthocereus occidentalis Britt. & Rose, Cactaceae 2: 125. 1920.

Sinaloa, the type from San Blas.

Stems rather weak, forming dense thickets; branches slender, 4 to 5 cm. in diameter, 3 to 5-angled, dull green, often bronzed; margins of ribs slightly sinuate; areoles 1 to 3 cm. apart, filled with short brown wool; spines numerous, nearly equal, yellowish, acicular, up to 7 cm. long; flowers 14 to 18 cm. long.

16. HELIOCEREUS Britt. & Rose, Contr. U. S. Nat. Herb, 12: 127. 1909.

Stems usually weak, procumbent or climbing over rocks and bushes, in cultivation often bushy and erect; branches strongly angled or ribbed; ribs or angles usually 3 or 4, sometimes up to 7; spines of all areoles similar; flowers diurnal, large, funnelform, only 1 at an areole, usually scarlet, some-

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[1] The name "pitahaya" (also written "pitajaya," and "pitaya") is generally employed in Mexico for fruits of cacti of the *Cereus* alliance. According to Orozco y Berra, the Nahuatl name for plants of this group is "tzapoochtli." Buelna reports the Otomí name as "bazttu"; and Asiain the Huastec names as "ocomtzatza" and "tzalza." The name of the State of the Sinaloa is said to be derived from two Indian words, "sina," pitahaya, and "lobala," round.

times white; tube short but definite; inner perianth segments elongate; stamens numerous, declined; ovary spiny.

One other species is known, a native of Guatemala.

Flowers red.

Inner perianth segments acuminate.

Style not longer than the stamens----------1. H. elegantissimus.

Style definitely longer than the stamens----------2. H. schrankii.

Inner perianth segments apiculate, rounded or abruptly tipped.

3. H. speciosus.

Flowers white----------4. H. amecamensis.

1. **Heliocereus elegantissimus** Britt. & Rose, Cactaceae **2**: 127. 1920.

Cereus coccineus Salm-Dyck; Pfeiff. Enum. Cact. 122. 1837. Not *C. coccineus* DC. 1828.

Native of Mexico.

Stems at first erect, low, 10 to 20 cm. high; branches often decumbent, light green, 3 to 5 cm. broad, mostly 3 or 4-angled; ribs strongly undulate; areoles large, 1.5 to 2 cm. apart, yellow-felted; spines acicular, 1 cm. long or less, the radial ones bristly and white, the inner stiff and recurved; flowers scarlet, 10 to 15 cm. broad; perianth segments lanceolate, acuminate, 7 cm. long or less; ovary 3 to 4 cm. long, oblong, with a few scattered spreading scales.

2. **Heliocereus schrankii** (Zucc.) Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 434. 1909.

Cereus schrankii Zucc.; Seitz, Allg. Gartenz. **2**: 244. 1834.

Type from Zimapán, Hidalgo.

Stems ascending, branching; joints 1 to 2 cm. broad, 3 or 4-angled, somewhat winged, when young reddish, in age green; areoles 1.5 to 2 cm. apart, somewhat elevated; spines 6 to 8, acicular, white when young, yellowish brown in age; flowers dark red, 14 cm. broad; ovary oblong, 4 cm. long, spiny.

3. **Heliocereus speciosus** (Cav.) Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 434. 1909.

Cactus speciosus Cav. Anal. Cienc. Nat. Madrid **6**: 339. 1803.

Cactus speciosissimus Desf. Mém. Mus. Hist. Nat. **3**: 193. 1817.

Cereus bifrons Haw. Suppl. Pl. Succ. 76. 1819.

Cereus speciosissimus DC. Prodr. **3**: 468. 1828.

Cereus speciosus Schum. in Engl. & Prantl, Pflanzenfam. **3**^{6a}: 179. 1894. Not *C. speciosus* Sweet, 1826.

Region of the City of Mexico and elsewhere in central Mexico. Reported from Central America.

Stems clambering or hanging, strongly 3 to 5-ribbed; old parts bright green, young parts reddish; ribs strongly undulate; areoles often 3 cm. apart, usually large, with felt and acicular spines; spines numerous, yellow or brownish in age, 1 to 1.5 cm. long; flowers scarlet, 15 to 17 cm. long, lasting for several days; perianth segments oblong, 10 to 12 cm. long, with rounded, often apiculate tips; ovary bearing scattered minute scales; fruit ovoid, 4 to 5 cm. long. "Santa Marta," "xoalacatl" (*Ramírez*).

4. **Heliocereus amecamensis** (Heese) Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 129. 1909.

Cereus amecamensis Heese; Rother, Prakt. Ratgeb. **11**: 442. 1896.

Cereus amecacnsis Heese, Gartenwelt **1**: 317. 1897.

Central Mexico; type from Amecameca, State of Mexico.

Plant pale green when young, similar to *H. speciosus* in habit and spines; ribs 3 to 5; flower 11 cm. long, 8 to 12.5 cm. in diameter; flower tube 3.5 cm. long, 1 cm. in diameter, green, with green scales and whitish bristles; outer perianth segments yellowish green, grading into oblanceolate white inner segments, 7 cm. long, 2 cm. wide; ovary cylindric, 6 mm. long.

17. CARNEGIEA Britt. & Rose, Journ. N. Y. Bot. Gard. 9: 187. 1908.

A single species is known.

1. Carnegiea gigantea (Engelm.) Britt. & Rose, Journ. N. Y. Bot. Gard. 9: 188. 1908.

Cereus giganteus Engelm. in Emory, Mil. Reconn. 159. 1848.

Pilocereus engelmannii Lem. Illustr. Hort. Lem. 9: Misc. 97. 1862.

Sonora. Southern Arizona and California; type from the Gila River, Arizona.

Stem simple and upright, up to 12 meters high, or with one or two lateral branches, sometimes with 8 to 12 branches, the branches 30 to 65 cm. in diameter; ribs 12 to 24, obtuse, 1 to 3 cm. high; areoles about 2.5 cm. apart or nearly contiguous on the upper part of the plant, densely brown-felted; spines of two kinds, those at the top of flowering plants acicular, yellowish brown, porrect, those of sterile plants and on the lower parts of flowering plants more or less subulate, the central one stouter than the radials, often 7 cm. long; flowers 10 to 12 cm. long, sometimes nearly as broad as long when fully expanded; tube about 1.5 cm. long, green, its scales broad and short, white-felted in their axils; throat about 3 cm. long, covered with numerous white stamens; style stout, 5 to 6 cm. long, white or cream-colored; ovary somewhat tuberculate, bearing scales with woolly axils; ovules numerous; berry red or purple, obtuse, 6 to 9 cm. long, edible, its few distant scales ovate, 2 to 4 mm. long, with or without 1 to 3 short acicular spines in their axils. "Pitahaya," "saguaro," "sahuaro" (sometimes variously written suwarrow, suwarro, suaharo, suguaro).

This is the state flower of Arizona. It is a very abundant and conspicuous plant in the southern part of that State and in northern Sonora.[1] The dried woody ribs of the stems were used by the Indians for lances and for the framework of huts. The fruit was an important article of food among all the Indians of the region. It was eaten raw or cooked and was sometimes dried and preserved for winter use. From it there was prepared a thick syrup which was employed for sweetening other food, and also an intoxicating beverage. The seeds contain much oil, and by the Papagos they were ground into a paste which was spread like butter upon tortillas. They were also eaten raw or ground and made into pinole. The seeds were sometimes collected and eaten after having passed through the body, a practice that was followed also by some of the Californian Indians in the case of *Opuntia* seeds.

18. RATHBUNIA Britt. & Rose, Contr. U. S. Nat. Herb. 12: 169. 1909.

Rather slender cacti, simple or bushy, the stems and branches weak, erect or bent; ribs 4 to 8, prominent; spines subulate, those of the flowering areoles not differing from the others; flowers diurnal, scarlet, solitary, usually at the upper areoles, narrowly tubular, the tube bearing distant long scales and

[1] See D. T. MacDougal, The suwarro, or tree cactus. Journ. N. Y. Bot. Gard. 6: 129–133. *f. 31, 32.* 1905.

united with it except at the tip, elongate, at first straight, or in age somewhat curved, the limb more or less oblique; perianth segments short, spreading or reflexed; filaments exserted; style slender, exserted beyond the tube; stigma lobes narrow; ovary with small scales bearing short felt and sometimes spines in their axils; fruit capped by the withered flower, spiny or becoming smooth, globular; seeds of the typical species black, compressed, minutely pitted, with a large basal oblique hilum.

Only two species are known.

Ribs 5 to 8; flowers 4 to 10 cm. long----------1. R. alamosensis.
Ribs 4: flowers 12 cm. long----------2. R. kerberi.

1. Rathbunia alamosensis (Coulter) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 415. 1909.

Cereus alamosensis Coulter, Contr. U. S. Nat. Herb. 3: 406. 1896.
Cereus sonorensis Rünge; Schum. Monatsschr. Kakteenk. 11: 135. 1901.
Cereus pseudosonorensis Gürke, Monatsschr. Kakteenk. 20: 147. 1910.
Sonora to Tepic; type from Alamos, Sonora.

Columnar, 2 to 3 meters high, at first erect but generally finally bent or curved, 8 cm. thick or less, rooting at or near the tip and thus forming new plants; ribs 5 to 8, obtuse; radial spines 11 to 18, spreading, straight, whitish; centrals 1 to 4, much stouter than the radials, 3 to 5 cm. long, porrect or ascending; flowers scarlet, 4 to 10 cm. long; scales on ovary small, acute or obtuse, with a small tuft of felt and a few bristle-like spines in the axils, those on the flower tube with a tuft of felt and sometimes with a spine; tube proper 1.5 cm. long; ovary tuberculate; fruit red, globular, 3 to 4 cm. in diameter, naked or bearing scattered clusters of 5 or 6 white acicular spines. "Sina," "cina."

2. Rathbunia kerberi (Schum.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 415. 1909.

Cereus kerberi Schum. Gesamtb. Kakt. 89. 1897.
Cleistocactus kerberi Goss. Bull. Mens. Soc. Nice 44: 33. 1904.
Type from Volcán de Colima.

Columnar, somewhat branched, 2 meters high; ribs 4, compressed; radial spines about 16, subulate; central spines 4, stouter than the radials, 4.5 cm. long; flowers 12 cm. long; outer perianth segments linear-lanceolate, rose-colored, reflexed; stamens exserted; scales on the ovary lanate in the axils.

19. **LOPHOCEREUS** Britt. & Rose, Contr. U. S. Nat. Herb. 12: 426. 1909.

The genus consists of a single species.

1. Lophocereus schottii (Engelm.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 427. 1909.

Cereus schottii Engelm. Proc. Amer. Acad. 3: 288. 1856.
Cereus sargentianus Orcutt, Gard. & For. 4: 436. 1891.
Cereus palmeri Engelm.; Coulter, Contr. U. S. Nat. Herb. 3: 401. 1896.
Sonora and Baja California; type collected near Magdalena, Sonora. Southern Arizona.

Usually branching only at base, forming large clumps sometimes with as many as 50 or even 100 upright or ascending stems, 1 to 7 meters high; ribs usually 5 to 7, sometimes 9, separated by broad intervals; bristles of the flowering areoles numerous, straight, finely acicular, gray, 6 cm. long or less; flowerless areoles smaller, little felted, with 3 to 7 short subulate spreading radial spines swollen at base and 1 or 2 central ones a little longer

and stouter; flowers 3 to 4 cm. long; style, stigma lobes, and filaments whitish; fruit 2 to 3 cm. in diameter, usually naked, rarely spiny; seeds 2.5 mm. long. "Cina," "zina," "sinita" (Sonora); "hombre viejo," "cabeza de viejo," "pitahaya barbona," "garambullo," "cabeza vieja" (Baja California).

The fruit is edible. For an illustration of the plant see Contr. U. S. Nat. Herb. 16: *pl. 125, B.*

20. **MYRTILLOCACTUS** Console, Boll. Ort. Bot. Palermo 1: 8. 1897.

Large cacti, usually with short trunks and large, much branched tops; the stout few-ribbed branches nearly erect, all the areoles bearing the same kind of spines; flowers diurnal, very small, several, sometimes as many as 9 at an areole, with very short tube and widely spreading perianth segments; ovary bearing a few minute scales with tufts of wool in their axils, spineless; fruit small, globular, edible; seed very small, black, with basal hilum.

One other species occurs in Guatemala.

Young branches very blue; central spine elongate, reflexed, dagger-like.
1. M. geometrizans.
Young branches green; central spine not dagger-like.
Spines usually 3 to 5, with no definite central spine, or this, if present, very short——**2. M. cochal.**
Spines 6 or more, with definite central spine——**3. M. schenckii.**

1. **Myrtillocactus geometrizans** (Mart.) Console, Boll. Ort. Bot. Palermo 1: 10. 1897.

Cereus geometrizans Mart.; Pfeiff. Enum. Cact. 90. 1837.
Cereus pugioniferus Lem. Cact. Aliq. Nov. 30. 1838.
Cereus gladiator Otto & Dietr. Allg. Gartenz. 6: 34. 1838.

San Luis Potosí to Oaxaca.

Treelike, with a short definite trunk crowned by a large, much branched top; branches often a little curved, bluish green, usually 5 or 6-ribbed, 6 to 10 cm. in diameter, very blue when young; ribs 2 to 3 cm. high, rounded; areoles 2 to 3 cm. apart; radial and central spines very different, almost filling the areoles; radial spines usually 5, rarely 8 or 9, usually short, 2 to 10 mm. long, but sometimes 3 cm. long, more or less turned backward, a little flattened radially but swollen at base; central spine elongate, dagger-shaped, flattened laterally, 1 to 7 cm. long and sometimes 6 mm. broad; flowers appearing from the upper part of the areole, 2.5 to 3.5 cm. broad, the limb 3 to 4 times as long as the tube; perianth segments oblong, 1.5 cm. long; fruit ellipsoid to subglobose, purplish or bluish, 1 to 2 cm. long. "Garambullo" (Durango, Hidalgo); "Padre Nuestro" (Oaxaca).

The fruit is edible and is offered for sale, both fresh and dried, in the markets.

2. **Myrtillocactus cochal** (Orcutt) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 427. 1909.

Cereus cochal Orcutt, West Amer. Sci. 6: 29. 1889.

Baja California, the type from Bahía de Todos Santos.

Plant 1 to 3 meters high, much branched; trunk short, woody, sometimes 30 cm. in diameter; ribs 6 to 8, obtuse, separated by shallow intervals; spines grayish to black; radial spines 5, short; central spines when present 2 cm. long; flowers open night and day, 2.5 cm. long and fully as broad; perianth segments usually 16, light green, the outer ones tinged with purple, oblong; fruit slightly acid, globular, 12 to 18 mm. in diameter, red. "Cochal."

The fruit is edible, and the stems are used for fuel.

3. **Myrtillocactus schenckii** (Purpus) Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 427. 1909.

Cereus schenckii Purpus, Monatsschr. Kakteenk. **19**: 38. 1909.

Puebla and Oaxaca; type from Sierra de Mixteca, Puebla.

Treelike, 3 to 5 meters high, with a very stout trunk and many short ascending branches, dark green; areoles circular, crowded with black felt, about 5 mm. apart; radial spines 6 to 8, straight, 5 to 12 mm. long, black or brownish; central spine 1, usually 2 cm. long, sometimes 5 cm. long; fruit oblong, 10 to 15 mm. long, naked; seeds black, pitted. "Vichishovo" (*Conzatti*).

21. HYLOCEREUS Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 428. 1909.

Climbing cacti, often epiphytic, with elongate stems normally 3-angled or 3-winged, and branches emitting aerial roots, the areoles bearing a tuft of felt and several short spines, or spineless in one species; areoles on seedlings and juvenile growths often bearing bristles; flowers very large, nocturnal, funnelform, the limb as broad as long and as long as the tube or longer; ovary and tube bearing large foliaceous scales but no spines, felt, wool, or hairs; outer perianth segments similar to the scales on the tube but longer; petaloid perianth segments narrow, acute or acuminate, mostly white, rarely red; stamens very many, in two series, equaling or shorter than the style; style cylindric, rather stout and thick, the linear stigma lobes numerous, simple or branched; fruit spineless but with several or many persistent foliaceous scales, mostly large and edible; seeds small, black.

Numerous other species are found in tropical America.

Stems bluish or more or less whitened or gray.
Spines short, conic----1. H. purpusii.
Spines acicular----2. H. ocamponis.
Stems bright green----3. H. undatus.

1. **Hylocereus purpusii** (Weing.) Britt. & Rose, Cactaceae **2**: 184. 1920.

Cereus purpusii Weing. Monatsschr. Kakteenk. **19**: 150. 1909.

Lowlands of western Mexico, the type from Tuxpan.

Stems bluish, climbing, elongate, epiphytic; ribs 3 or 4, with horny margins only slightly undulate; areoles small; spines 3 to 6, short; flowers 25 cm. long and nearly as broad when fully expanded; outer perianth segments narrow, purplish; middle perianth segments golden; inner perianth segments broad, white except at the golden tips.

2. **Hylocereus ocamponis** (Salm-Dyck) Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 429. 1909.

Cereus ocamponis Salm-Dyck, Cact. Hort. Dyck. 1849. 220. 1850.

Perhaps native of Mexico; original locality either Mexico or Colombia; specimens closely related but probably distinct have been collected in Sinaloa.

Stems strongly 3-angled, at first bright green, soon glaucous, dull bluish green in age; ribs rather deeply undulate, their margins with a horny brown border; areoles 2 to 4 cm. apart, borne near the bottom of each undulation; spines 5 to 8, acicular, 5 to 12 mm. long; flowers 25 to 30 cm. long and fully as broad; outer perianth segments narrow, long-acuminate, greenish, spreading or reflexed, the inner oblong, acuminate, white; ovary covered with imbricate ovate acute purplish-margined scales.

3. **Hylocereus undatus** (Haw.) Britt. & Rose; Britton, Fl. Bermuda 256. 1918.

Cereus undatus Haw. Phil. Mag. **7**: 110. 1830.

Cereus tricostatus Goss. Bull. Soc. Bot. France **54**: 664. 1907.

Widely cultivated in Mexico and often naturalized. Native country not known, but widely distributed in cultivation in the tropics; originally described from Chinese plants.

Stem long, clambering over bushes and trees or creeping up the sides of walls; ribs mostly 3, broad, thin, green; margin usually strongly undulate, more or less horny in age; areoles 3 to 4 cm. apart; spines 1 to 3, small, 2 to 4 mm. long; flowers up to 29 cm. long or more; outer perianth segments yellowish green, all turned back, some strongly reflexed; inner perianth segments pure white, erect, broad, oblanceolate, entire, with apiculate tips; fruit oblong, 10 to 12 cm. in diameter, red, covered with large foliaceous scales, or nearly smooth when mature; seeds black. "Pitahaya" (Jalisco, Yucatán, Costa Rica, El Salvador, Porto Rico); "pitahaya orejona" (Oaxaca, *Reko*); "tasajo" (Durango, *Patoni*); "junco," "juco tapatío" (*Conzatti*); "chacoub," "zacoub" (Yucatán); "caliz" (Philippines).

This species has often been reported from Mexico as *Cereus triangularis* (a species known only from Jamaica) and as *C. trigonus*. The large fruit is of excellent quality and is much eaten. Grosourdy reports that the juice of the stems is acrid and caustic and is employed externally and internally as a vermicide, although internal use is dangerous. The plant is the best known of all the night-blooming cereuses, and produces very showy flowers.

22. SELENICEREUS Britt. & Rose, Contr. U. S. Nat. Herb. 12: 429. 1909.

Slender, trailing, climbing or clambering, elongate cacti, the joints ribbed or angled, irregularly giving off aerial roots; areoles small, sometimes elevated on small knobs, bearing small spines or in one species spineless; flowers large, often very large, nocturnal; flower tube elongate, somewhat curved; scales of ovary and flower tube small, usually with long felt, hairs, and bristles in their axils; upper scales and outer perianth segments similar, narrow, greenish, brownish, or orange; inner perianth segments broad, white, usually entire; filaments elongate, weak, numerous, in two clusters distinctly separated, one cluster forming a circle at top of flower tube, the other scattered over the long slender throat; style elongate, thick, often hollow; stigma lobes slender, numerous, entire; fruit large, reddish, covered with clusters of deciduous spines, bristles, and hairs.

Several other species occur in tropical America.

Areoles of flower tube and ovary without long hairs.
  Spines of the branch areoles acicular——7. S. vagans.
  Spines of the branch areoles short, conic.
    Ribs 7 or 8, obtuse; spines from areoles on ovary 1 to 3——8. S. murrillii.
    Ribs 4 to 6, acute; spines from areoles on ovary 10 or more.
      9. S. spinulosus.

Areoles of flower tube and ovary bearing long hairs.
  Branches with a stout deflexed spur under each areole——6. S. hamatus.
  Branches not spurred.
    Spines of branch areoles acicular.
      Hairs of flower areoles tawny or whitish——1. S. grandiflorus.
      Hairs of flower areoles bright white——2. S. coniflorus.
    Spines of branch areoles short, conic.
      Branches 9 or 10-ribbed; branch areoles with many appressed hairs.
        3. S. donkelaarii.
      Branches 4 to 6-ribbed; young branch areoles with few long hairs.
        Stems stout, 3 to 5 cm. thick——4. S. pteranthus.
        Stems slender, 1.5 to 3 cm. thick——5. S. boeckmannii.

1. Selenicereus grandiflorus (L.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 430. 1909.

Cactus grandiflorus L. Sp. Pl. 467. 1753.

Cereus grandiflorus Mill. Gard. Dict. ed. 8. *Cereus* no. 11. 1768.

Commonly cultivated in Mexico, and elsewhere in tropical regions. Native of Jamaica and Cuba.

Stems clambering, often 2.5 cm. in diameter, green or bluish green; ribs usually 7 or 8, sometimes fewer, low, separated by broad rounded intervals; spines acicular, 1 cm. long or less, yellowish brown or brownish, in age gray, intermixed with the numerous whitish hairs; flower buds covered with tawny hairs; flowers about 18 cm. long; outer perianth segments narrow, salmon-colored; inner perianth segments white, acute, entire; fruit ovoid, 8 cm. long. "Organillo" (Tamaulipas); "reina de la noche"; "gigante" (Durango); "reina de las flores" (Porto Rico).

This is a well-known night-blooming cereus, often cultivated for its handsome fragrant flowers. The fruit is edible. The flowers and stems contain several acrid principles, including probably an alkaloid and a glucoside, to one of which the name cactine has been given. The drug obtained from the plant has an action similar to that of digitalis, and is used also in the treatment of rheumatism.

2. Selenicereus coniflorus (Weing.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 199. 1909.

Cereus coniflorus Weing. Monatsschr. Kakteenk. 14: 118. 1904.

Selenicereus pringlei Rose, Contr. U. S. Nat. Herb. 12: 431. 1909.

Cereus jalapensis Vaupel, Monatsschr. Kakteenk. 23: 26. 1913.

Eastern Mexico, especially in Veracruz.

Stems high-climbing, giving off numerous aerial roots, pale green, becoming purplish along the ribs, 5 or 6-ribbed; intervals between the ribs either depressed or shallow; margins of the ribs slightly wavy to strongly knobby; spines acicular, pale yellow, the radials 4 to 6, with 1 central, porrect, 1 to 1.5 cm. long; bristles from the lower part of areoles 2, reflexed; buds globular, covered with white hairs; flowers 22 to 25 cm. long; outer perianth segments linear, light orange or bronze to lemon-yellow; inner perianth segments pure white, apiculate; scales on ovary and flower tube linear, reddish, their axils bearing white hairs and spines; fruit globose, about 6 cm. in diameter.

The plant is reported to have been gathered in large quantities in Veracruz and shipped to the United States for use in the preparation of medicine.

3. Selenicereus donkelaarii (Salm-Dyck) Britt. & Rose, Cactaceae 2: 200. 1920.

Cereus donkelaarii Salm-Dyck, Allg. Gartenz. 13: 355. 1845.

Yucatán.

Stems elongate, creeping or ascending, 8 meters long or more, slender, about 1 cm. thick; ribs 9 to 10, obtuse, often indistinct; spines in clusters of 10 to 15, the radials 3 to 4 mm. long, setaceous, appressed; central spines 1 or several, 1 to 2 mm. long; flowers 18 cm. long, the slender tube 6 to 7 cm. long; outer perianth segments reddish, linear; inner perianth segments white, entire, 6 to 8 cm. long, about 1 cm. wide, acuminate.

4. Selenicereus pteranthus (Link & Otto) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 431. 1909.

Cereus pteranthus Link & Otto, Allg. Gartenz. 2: 209. 1834.

Cereus nycticallus Link; Dietr. Wochenschr. Ver. Beförd. Gartenb. 10: 372. 1834.

Cereus brevispinulus Salm-Dyck, Hort. Dyck. 339. 1834.

Mexico, but known only from cultivated plants or from plants escaped from gardens.

Stems stout, often 3 to 5 cm. in diameter, bluish green to purple, strongly 4 to 6-angled; ribs of young branches sometimes 2 to 3 mm. high; spines 1 to 4, 1 to 3 mm. long, dark, conic; flowers 25 to 30 cm. long, very fragrant, the tube and throat 13 cm. long, swollen above, 5 cm. in diameter; outer perianth segments linear, 12 cm. long; inner perianth segments white, spatulate-oblong, 3 to 4 cm. broad above, acuminate; tube proper about 2 cm. long, yellow within; ovary covered with long white silky hairs and bristles, 10 to 12 mm. long; fruit globular, red, 6 to 7 cm. in diameter.

5. Selenicereus boeckmannii (Otto) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 429. 1909.

Cereus boeckmannii Otto; Salm-Dyck, Cact. Hort. Dyck. 1849. 217. 1850.

Cereus irradians Lem. Illustr. Hort. Lem. 11: Misc. 74. 1864.

Cereus vaupelii Weing. Monatsschr. Kakateenk. 22: 106. 1912.

Eastern Mexico. Cuba and Hispaniola.

Stems light green, 1 to 2 cm. in diameter, strongly angled; ribs 3 to 8, slightly if at all undulating; areoles at first brownish but white in age; spines and hairs in the areoles at first purplish, the spines 3 to 6, becoming yellowish, 2 mm. long or less; flowers not fragrant, 24 to 39 cm. long; outer perianth segments and scales linear, brownish; inner perianth segments oblanceolate, 10 cm. long by 3 cm. broad at widest place, pure white; tube and throat 14 cm. long, bearing scattered short linear acute reddish scales, their axils bearing long brown silky hairs and brown bristles; ovary strongly tuberculate; fruit globular, 5 to 6 cm. in diameter.

6. Selenicereus hamatus (Scheidw.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 203. 1909.

Cereus hamatus Scheidw. Allg. Gartenz. 5: 371. 1837.

Cereus rostratus Lem. Cact. Aliq. Nov. 29. 1838.

Southern and eastern Mexico.

Stem bright green, long and clambering, the branches strongly 4-angled, rarely 3-angled, about 1.5 cm. thick; areoles with spines and black wool, remote, at the upper edges of knobby projections, these often forming obtuse deflexed spurs about 1 cm. long; spines on juvenile plants bristle-like, white, on old branches fewer, stouter, brown or black; flower 20 to 25 cm. long; upper scales dark green, tinged with red; outer perianth segments pale green, narrow, about 8 cm. long; inner perianth segments broad, white; flower tube 10 cm. long, 22 mm. in diameter, its areoles long-hairy.

7. Selenicereus vagans (K. Brandeg.) Britt. & Rose, Cactaceae 2: 205. 1920.

Cereus vagans K. Brandeg. Zoe 5: 191. 1904.

Cereus longicaudatus Weber; Goss. Bull. Mus. Hist. Nat. 10: 384. 1904.

Western coast of Mexico; type from Mazatlán, Sinaloa.

Stems creeping over rocks, often forming large clumps, more or less rooting, 1 to 1.5 cm. in diameter; ribs about 10, low; areoles 1 to 1.5 cm. apart; spines acicular, numerous, less than 1 cm. long, brownish yellow; flower 15 cm. long; tube, including throat, about 9 cm. long, slightly curved, brownish, with small scattered scales bearing clusters of 5 to 8 acicular spines in their axils; throat narrow, 5 cm. long; outer perianth segments linear, brownish to greenish white, 6 cm. long; inner perianth segments white, oblanceolate, 6 cm. long, with short acuminate tips, the margins undulate or toothed, especially above; ovary covered with acicular spines.

8. Selenicereus murrillii Britt. & Rose, Cactaceae 2: 206. 1920.

Type from Colima.

A slender vine 6 meters long or more, 8 mm. in diameter, dark green, the ribs more or less purplish; ribs 7 or 8, low, obtuse, separated by broad intervals; areoles 1 to 2 cm. apart, small, bearing white wool and minute spines; spines 5 or 6, the two lower ones reflexed, 1 to 2 cm. long, the others conic, greenish to black; flower 15 cm. long, the tube and throat 6 cm. long, bearing a few slightly elevated areoles, these white-felted and bearing 1 or 2 minute spines; outer perianth segments greenish yellow, linear to linear-lanceolate, acute, the inner pure white, broadly spatulate, obtuse; ovary bearing numerous rather large areoles, these white-felted and with 1 to 3 short spines but no long hairs.

9. Selenicereus spinulosus (DC.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 431. 1909.

Cereus spinulosus DC. Mém. Mus. Hist. Nat. 17: 117. 1828.

Tamaulipas and elsewhere in eastern Mexico. Southern Texas.

Stems clambering, 2 to 4 meters long, 1 to 2 cm. in diameter, producing numerous aerial roots, light green, somewhat shining, usually angled but sometimes nearly terete; ribs 4 to 6, or sometimes more; spines very short, yellowish or becoming blackish; radial spines 5 or 6, with 2 reflexed bristles at base of the areole; central spine 1, rarely 2, on juvenile branches more numerous and more acicular, white; flower 12 to 14 cm. long; tube about 5 cm. long, with a few clusters of small spines; outer perianth segments narrowly oblong, 5 to 6 cm. long, acute, spreading; inner perianth segments pinkish to white, narrowly oblong, acute; ovary covered with clusters of spines similar to those on the tube.

23. DEAMIA Britt. & Rose, Cactaceae 2: 212. 1920.

The genus consists of a single species.

1. Deamia testudo (Karw.) Britt. & Rose, Cactaceae 2: 213. 1920.

Cereus testudo Karw.; Zucc. Abh. Akad. Wiss. München 2: 682. 1837.

Cereus pterogonus Lem. Cact. Hort. Monv. 59. 1839.

Cereus pentapterus Otto; Salm-Dyck, Cact. Hort. Dyck. 1849. 221. 1850.

Cereus miravallensis Weber, Bull. Mus. Hist. Nat. 8: 459. 1902.

Veracruz and elsewhere in southern Mexico. Central America and Colombia.

Stems and joints various, 3 to 10 cm. broad, or perhaps even more; ribs thin, winglike, 1 to 3 cm. high; areoles 1 to 2 cm. apart or on juvenile growth much closer; spines spreading, 10 or more, 1 to 2 cm. long, brownish; flowers 28 cm. long, with a long slender tube 10 cm. long expanding into a broad throat nearly as long as the tube; inner perianth segments linear-oblong, acuminate, 8 to 10 cm. long; stamens numerous; style slender, 24 to 25 cm. long; stigma lobes linear, numerous; scales on ovary 1 mm. long or less; hairs on ovary and flower tube brown, 1 to 3 cm. long.

DOUBTFUL SPECIES.

CEREUS ACANTHOSPHAERA Weing. Monatsschr. Kakteenk. 24: 81. 1914. Type from Río de Santa María, Veracruz. Perhaps a species of *Deamia*.

24. APOROCACTUS Lem. Illustr. Hort. Lem. 7: Misc. 67. 1860.

Slender vinelike cacti, creeping or clambering, sending out aerial roots freely, day-blooming; flowers rather small, one at an areole, funnelform, pink to red, the tube nearly straight, or bent just above the ovary, the limb some-

what oblique; outer perianth segments linear, spreading or recurved, scattered; inner perianth segments broad, more compact than the outer ones; stamens exserted, in a single, somewhat 1-sided cluster; filaments all along the throat; tube proper about the length of the narrow throat; fruit globose, small, reddish, setose; seeds few, reddish brown, obovate.

The species here listed are the only ones known.

Flowers strongly bent just above the ovary.
  Branches very slender; ribs 7 or 8 ..... 1. **A. leptophis.**
  Branches stouter; ribs 10 to 12.
    Outer perianth segments narrow, the inner ones apiculate. 2. **A. flagelliformis.**
    Outer perianth segments oblong, the inner ones acuminate. 3. **A. flagriformis.**
Flowers nearly straight.
  Inner perianth segments acute ..... 4. **A. conzattii.**
  Inner perianth segments acuminate ..... 5. **A. martianus.**

1. **Aporocactus leptophis** (DC.) Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 435. 1909.

Cereus leptophis DC. Mém. Mus. Hist. Nat. **17**: 117. 1828.

Native of Mexico.

Often creeping; branches cylindric, 8 to 10 mm. thick, rather strongly 7 or 8-ribbed; ribs obtuse, somewhat repand; areoles velvety, with 12 or 13 rigid setaceous spines; perianth segments narrowly oblong, 2 to 3 cm. long, about 6 mm. wide.

2. **Aporocactus flagelliformis** (L.) Lem. Illustr. Hort. Lem. **7**: Misc. 68. 1860.

Cactus flagelliformis L. Sp. Pl. 467. 1753.

Cereus flagelliformis Mill. Gard. Dict. ed. 8. *Cereus* no. 12. 1768.

Common in cultivation in Mexico, and elsewhere in tropical regions; native habitat not known.

Stems at first ascending or erect, but weak and slender or pendent, 1 to 2 cm. in diameter; branches often prostrate and creeping or even pendent; ribs 10 to 12, low and inconspicuous, a little tuberculate; areoles 6 to 8 mm. apart; radial spines 8 to 12, acicular, reddish brown; central spines 3 or 4, brownish with yellow tips; flowers 7 to 8 cm. long, opening for 3 or 4 days, crimson; outer perianth segments narrow, more or less reflexed; inner perianth segments broader, only slightly spreading; fruit globose, 10 to 12 mm. in diameter, red, bristly; pulp yellowish. "Flor del cuerno," "floricuerno," "flor del látigo," hierba de la alferecía," "junco," "junquillo," "cuerno."

This plant is much cultivated in Mexico, and also in the United States, where it is known as rat-tail cactus. An infusion of the dried flowers is employed in Mexico for heart affections. The juice of the plant is said to be acrid and caustic. It is administered internally as a vermifuge, but its use is said to be dangerous.

3. **Aporocactus flagriformis** (Zucc.) Lem.; Britt. & Rose, Contr. U. S. Nat. Herb. **12**: 435. 1909.

Cereus flagriformis Zucc.; Pfeiff. Enum. Cact. 111. 1837.

Native of Mexico, the type from San José del Oro, Oaxaca.

At first erect and rather stout, afterwards creeping, very much branched; branches green, 10 to 24 mm. in diameter; ribs 11, very low, obtuse, somewhat tuberculate; areoles small, 4 to 6 mm. apart; radial spines 6 to 8, 4 mm. long, acicular, horn-colored; central spines 4 or 5, shorter than the radials but

stouter, brown; flowers dark crimson, 10 cm. long, 7.5 cm. broad or more; flower tube 3 cm. long or more; perianth segments in 3 series, the series well separated; inner perianth segments oblong, 10 mm. broad, acuminate; stamens red, erect, exserted.

4. **Aporocactus conzattii** Britt. & Rose, Cactaceae **2**: 220. 1920.

Type from Cerro San Felipe, Oaxaca.

Creeping, clambering, or hanging from a support, developing aerial roots here and there; stems 12 to 25 mm. in diameter; ribs 8 to 10, rather prominent, low-tuberculate; areoles 3 to 4 mm. apart; spines 15 to 20, acicular, light brown, unequal, the longest 12 mm. long; buds nearly erect, covered with brown acicular spines or bristles; flowers 8 to 9 cm. long; tube nearly straight, red, bearing a few ovate scales, their axils short-woolly and with a few bristle-like spines; upper inner perianth segments arching forward, the lower ones somewhat reflexed, all narrow, 6 to 7 mm. broad, acute, brick-red; tube proper 2 to 2.5 cm. long; throat about 1 cm. long, narrow, bearing stamens all over its surface.

5. **Aporocactus martianus** (Zucc.) Britt. & Rose, Cactaceae **2**: 220. 1920.

Cereus martianus Zucc. Flora **15**[2]: Beibl. 66. 1832.

Eriocereus martianus Riccobono, Boll. Ort. Bot. Palermo **8**: 240. 1909.

Central Mexico.

Stems rather stout, somewhat branched, 15 to 18 mm. in diameter; ribs about 8, low, obtuse; areoles 12 mm. apart; spines 6 to 8, acicular to bristle-like; flowers a deep rose, 8 to 10 cm. long; outer perianth segments narrowly lanceolate, acuminate; perianth segments similar but long-acuminate; fruit globular, 2 cm. in diameter, greenish, spiny.

25. ECHINOCEREUS Engelm. in Wisliz. Mem. North. Mex. 91. 1848.

Plants always low, perennial, erect or prostrate, sometimes pendent over rocks and cliffs, single or cespitose, globular to cylindric, prostrate or pendent if elongate; spines of flowering and sterile areoles similar; flowers usually large, in some species small, diurnal, in some not closing at night; perianth campanulate to short-funnelform, scarlet, crimson, purple, or rarely yellow, the tube and ovary always spiny; stigma lobes always green; fruit more or less colored, thin-skinned, spiny, the spines easily detached when mature; seeds black, tuberculate.

Besides the species listed here, several others occur in the southwestern United States. The fruit of most of the species is edible and often of superior quality.

Flowers small, 1.2 cm. long or less ..... **45. E. barthelowanus.**
Flowers large, usually conspicuous, rarely only 2 to 3 cm. long.
  Stems covered with long weak bristles or hairs ..... **1. E. delaetii.**
  Stems covered with spines, or rarely spineless.
    Flowers scarlet to salmon-colored, opening once but lasting for several days.
      Stems usually weak, often trailing or at least becoming prostrate; ribs nearly continuous.
        Flowers rosy red ..... **2. E. scheeri.**
        Flowers orange-red to salmon-colored.
          Flowers 8 to 11 cm. long; wool from areoles on flower tube long.
            Flowers 8 to 10 cm. long; radial spines 9 or fewer. **3. E. salm-dyckianus.**
            Flowers 11 cm. long; radial spines 10 to 12 ..... **4. E. huitcholensis.**
          Flowers 6 cm. long or less; wool from areoles on flowers shorter than the subtending scales ..... **5. E. pensilis.**

Stems usually erect and stout; ribs more or less tuberculate.
Plants forming large mounds, sometimes with 500 to 800 joints; spines white, long and flexuous——6. E. mojavensis.
Plants in much smaller clusters; spines brownish or grayish, not long and flexuous.
Plant body with 12 to 14 ribs——7. E. leeanus.
Plant body with 5 to 11 ribs (in one species 12).
Axils of flower scales filled with long cobwebby hairs.
Flowers 5 to 6 cm. long; spines yellowish at first.
8. E. polyacanthus.
Flowers 3 cm. long; spines reddish at first——9. E. pacificus.
Axils of flower scales bearing short hairs.
Stems elongate and thin——10. E. acifer.
Stems short and thick——11. E. rosei.
Flowers usually purple, sometimes yellow or greenish yellow, rarely pink or nearly white, broad, rotate to campanulate, opening in sunlight, closing at night.
Flowers yellow or greenish white.
Plants densely cespitose——12. E. maritimus.
Plants usually solitary.
Ribs very stout.
Ribs 5 to 8; spines on flower tube and ovary short.
13. E. subinermis.
Ribs 8 or 9; spines on flower tube and ovary acicular.
14. E. luteus.
Ribs low, usually hidden by the spines.
Flowers 2.5 cm. long or less——15. E. chloranthus.
Flowers 5 to 10 cm. long.
Flowers greenish white——16. E. grandis.
Flowers yellow-red.
Central spines in more than one row——17. E. dasyacanthus.
Central spines in one vertical row——18. E. ctenoides.
Flowers purple.
Stems weak, slender, and creeping.
Stems 2 cm. thick or less.
Areoles distant; spines not interlocking.
Perianth segments narrowly oblong or linear-oblanceolate.
19. E. blanckii.
Perianth segments oblong-erose——20. E. pentalophus.
Areoles approximate; spines densely interlocking——21. E. sciurus.
Stems 3 to 4 cm. thick——22. E. cinerascens.
Stems stout, usually erect or ascending.
Areoles elliptic to circular, closely set, often with pectinate spines.
Areoles circular; spines not pectinate.
Areoles about 5 mm. apart; spines densely interlocking.
28. E. scopulorum.
Areoles about 1 cm. apart; spines scarcely interlocking.
29. E. roetteri.
Areoles elliptic; spines pectinate.
Central spine often very long——23. E. adustus.
Central spine, if present, short.
Spines of ovary and flower tube slender and weak, the surrounding hairs long and cobwebby——24. E. reichenbachii.

Spines of ovary and flower tube short and stout, the surrounding hairs short.
Central spines none.
Stems cylindric----25. E. rigidissimus.
Stems globular----26. E. weinbergii.
Central spines present----27. E. pectinatus.
Areoles nearly circular, not so closely set; spines never pectinate.
Ovary strongly tuberculate----30. E. chlorophthalmus.
Ovary not strongly tuberculate.
Flowers small, 2.5 to 5 cm. long.
Plants strongly angled; flowers pinkish--31. E. knippelianus.
Plants not strongly angled; flowers purple.
Central spines none.
Spines 3 to 5; flower tube and ovary without long wool from the areoles----32. E. pulchellus.
Spines 6 to 8; flower tube and ovary bearing long cobwebby wool from the areoles----33. E. amoenus.
Central spines 1 or more.
Central spine one----34. E. palmeri.
Central spines several, much elongate, dagger-like.
35. E. brandegeei.
Flowers large, 6 to 12 cm. long.
Central spines none----36. E. hempelii.
Central spines present.
Central spine solitary, rarely 2.
Spines red at base----37. E. merkeri.
Spines not red at base.
Plants stout, erect----38. E. fendleri.
Plants weak, becoming prostrate-39. E. enneacanthus.
Central spines several.
Spines not white.
Spines yellowish brown to red----40. E. engelmannii.
Spines bluish to blackish----41. E. sarissophorus.
Spines usually white or straw-colored.
Ribs 7 to 9----42. E. dubius.
Ribs 11 to 13.
Flowers campanulate----43. E. conglomeratus.
Flowers short-funnelform----44. E. stramineus.

1. **Echinocereus delaetii** Gürke, Monatsschr. Kakteenk. 19: 131. 1909.
Cephalocereus delaetii Gürke, Monatsschr. Kakteenk. 19: 116. 1909.
Known only from the Sierra de Paila, north of Parras, Coahuila.
Low, 10 to 20 cm. high, densely cespitose, completely hidden by the long white curled hairs; ribs indistinct; areoles closely set, bearing 15 or more white reflexed hairs 8 to 10 cm. long and a few stiff reddish bristles; flowers appearing near the top of plant; perianth segments pink, oblanceolate, acute; ovary covered with clusters of long white bristly spines.
In appearance this resembles small plants of *Cephalocereus senilis*.

2. **Echinocereus scheeri** (Salm-Dyck) Rümpler; Först. Handb. Cact. ed. 2. 801. 1885.
Cereus scheeri Salm-Dyck, Cact. Hort. Dyck. 1849. 190. 1850.
Chihuahua, the type collected near the City of Chihuahua.

Cespitose; stems procumbent, prostrate or ascending, decidedly narrowed toward the tip, 10 to 22 cm. long, yellowish green; ribs 8 to 10, rather low, not at all sinuate, somewhat spiraled; spines 7 to 12, acicular, white with brown or blackish tips; flowers 12 cm. long, rose-red to crimson, with an elongate tube; perianth segments oblanceolate, acute.

3. **Echinocereus salm-dyckianus** Scheer in Seem. Bot. Voy. Herald 291. 1856.
Cereus salm-dyckianus Hemsl. Biol. Centr. Amer. Bot. **1**: 545. 1880.
Echinocereus salmianus Rümpler; Först. Handb. Cact. ed. 2. 809. 1885.
Cereus salmianus Weber, Dict. Hort. Bois 279. 1894.
Chihuahua and Durango; type collected near the City of Chihuahua.

Cespitose; stems more or less decumbent, 2 to 4 cm. in diameter, elongate, yellowish green; ribs 7 to 9, low, more or less sinuate; radial spines 8 or 9, acicular, yellowish, about 1 cm. long; central spine solitary, porrect, a little longer than the radials; flowers orange-colored, 8 to 10 cm. long, narrow, the tube elongate, the areoles of the flower tube and ovary bearing white bristly spines and cobwebby hairs; perianth segments oblanceolate to spatulate.

4. **Echinocereus huitcholensis** (Weber) Gürke, Monatsschr. Kakteenk. **16**: 23. 1906.
Cereus huitcholensis Weber, Bull. Mus. Hist. Nat. **10**: 383. 1904.
Known only from the type locality, Sierra de Nayarit, Jalisco.

Plants 4 to 6 cm. in diameter; radial spines 10 to 12; central spine usually solitary; flowers 11 cm. long, or less, narrow, with a pronounced tube; color of perianth segments uncertain but perhaps orange; spines on ovary and tube weak, acicular; areoles of flower tube bearing long cobwebby hairs.

5. **Echinocereus pensilis** (K. Brandeg.) Purpus, Monatsschr. Kakteenk. **18**: 5. 1908.
Cereus pensilis K. Brandeg. Zoe **5**: 192. 1904.
Cape Region of Baja California, the type from Sierra de la Laguna.

More or less cespitose, the stems often erect, 30 cm. high or when growing on cliffs hanging and then nearly 2 meters long, 3 to 4 cm. in diameter; ribs 8 to 10, low; areoles about 10 mm. apart; spines needle-like, at first yellow, becoming reddish gray, the longest not over 2 cm. long; radial spines about 8; central spine 1; flowers orange-red, narrow, 5 to 6 cm. long; areoles on ovary and tube bearing short, yellow or white wool and chestnut-colored bristly spines; fruit globular, 1.5 to 2 cm. in diameter; seeds black, rugose, very oblique at base.

6. **Echinocereus mojavensis** (Engelm. & Bigel.) Rümpler; Först. Handb. Cact. ed. 2. 803. 1885.
Cereus mojavensis Engelm. & Bigel. Proc. Amer. Acad. **3**: 281. 1856.
Cereus bigelovii Engelm. U. S. Rep. Miss. Pacif. **4**: *pl. 4, f. 8.* 1856.
Reported from Sonora. Southwestern United States, the type from the Mojave River, California.

Cespitose, growing in massive clumps, often forming mounds, with hundreds of stems (500 to 800 have been recorded); stems globose to oblong, 5 to 20 cm. long, pale green; ribs 8 to 13, 5 to 6 mm. high, but becoming indistinct on old parts of stem, somewhat undulate; areoles circular, about 1 cm. apart; spines all white, or in age gray; radial spines about 10, acicular, spreading, curved, 1 to 2.5 cm. long; central spine subulate, porrect or somewhat spreading, often weak, 3 to 5 cm. long; flowers rather narrow, 5 to 7 cm. long, crimson; perianth segments broad, obtuse or even retuse; areoles on ovary with white felt and short acicular spines; fruit oblong, 2.5 to 3 cm. long.

7. **Echinocereus leeanus** (Hook.) Lem.; Först. Handb. Cact. ed. 2. 828. 1885.
Cereus leeanus Hook. in Curtis's Bot. Mag. **75**: *pl. 4417*. 1849.
Echinocereus multicostatus Cels; Först. Handb. Cact. ed. 2. 828. 1885.
Native of Mexico, but the range unknown.

Plant erect, about 30 cm. high, 10 cm. thick at base, tapering gradually toward the top, simple so far as known; ribs 12 to 14, acute, bearing rather closely set areoles; spines about 12, acicular, very unequal in length, the central and longest about 2.5 cm. long; flowers brick-red, 5 to 6 cm. long; inner perianth segments somewhat spreading, spatulate to obovate, 3 cm. long, acute.

8. **Echinocereus polyacanthus** Engelm. in Wisliz. Mem. North. Mex. 104. 1848.
Cereus polyacanthus Engelm. in A. Gray, Pl. Fendl. 50. 1849.
Chihuahua and Durango; type from Cosihuiriachi, Chihuahua. Arizona.

Cespitose, forming clumps of 20 to 50 stems, pale green but often tinged with red; ribs usually 10, low; areoles approximate; spines gray when old, at first pale yellow, becoming more or less purplish; radial spines about 12; centrals 4, straight, elongate; flowers crimson, 6 cm. long; spines on ovary and flower tube yellow, intermixed with cobwebby wool. "Pitahaya."

9. **Echinocereus pacificus** (Engelm.) Britt. & Rose, Cactaceae **3**: 12. 1922.
Cereus phoeniceus pacificus Engelm. West Amer. Sci. **2**: 46. 1886.
Cereus pacificus Coulter, Contr. U. S. Nat. Herb. **3**: 397. 1896.
Northern Baja California; type from Bahía de Todos Santos.

Cespitose, growing in clumps 30 to 60 cm. in diameter, sometimes containing 100 stems, these 15 to 25 cm. long, 5 to 6 cm. in diameter; ribs 10 to 12, obtuse; spines gray, with a reddish tinge; radial spines 10 to 12, 5 to 10 mm. long; central spines 4 to 5, the longest sometimes 25 mm. long; flowers deep red, rather small, about 3 cm. long; areoles on ovary and flower tube bearing long tawny wool and reddish brown bristly spines; fruit spiny.

10. **Echinocereus acifer** (Otto) Lem.; Först. Handb. Cact. ed. 2. 798. 1885.
Cereus acifer Otto; Salm-Dyck, Cact. Hort. Dyck. 1849. 189. 1850.
Echinocereus durangensis Rümpler; Först. Handb. Cact. ed. 2. 799. 1885.
Reported from Durango and Coahuila.

Cespitose, glossy green, erect; ribs 10, strongly tubercled; radial spines 5 to 10, 10 to 16 mm. long, pale brownish, bulbose and purplish at base; centrals 4, stout, purplish brown, the three upper erect, the lower and stouter one subdeflexed; flowers scarlet.

11. **Echinocereus rosei** Woot. & Standl. Contr. U. S. Nat. Herb. **19**: 457. 1915.
Chihuahua. Western Texas and southern New Mexico; type from Agricultural College, New Mexico.

Cespitose, forming small compact clumps, the stems 10 to 20 cm. long, 5 to 8 cm. in diameter, sometimes as many as 40; ribs 8 to 11, obtuse; areoles rather closely set; spines pinkish to brownish gray; radial spines about 10, spreading; centrals 4, 4 to 6 cm. long; flowers 4 to 6 cm. long, scarlet; inner perianth segments broad, obtuse; spines on ovary and flower tube brownish or yellowish, intermixed with short hairs; fruit spiny.

12. **Echinocereus maritimus** (Jones) Schum. Gesamtb. Kakt. 273. 1898.
Cereus maritimus Jones, Amer. Nat. **17**: 973. 1883.
Cereus flaviflorus Engelm.; Coulter, Contr. U. S. Nat. Herb. **3**: 391. 1896.
Echinocereus flaviflorus Schum. Gesamtb. Kakt. 274. 1898.
West coast of Baja California; type from Ensenada.

Decidedly cespitose, often forming clumps 60 to 90 cm. broad and 30 cm. high, sometimes containing 200 joints; individual joints globose to short-cyl-

indric, 5 to 16 cm. long; ribs 8 to 10; areoles 10 to 12 mm. apart; radial spines about 10, spreading; central spines 4, stout and angled, 2.5 to 3.5 cm. long; flowers 3 to 4 cm. long, arising from near the top of the plant, light yellow; inner perianth segments oblanceolate, rounded at apex; ovary not very spiny.

13. **Echinocereus subinermis** Salm-Dyck in Seem. Bot. Voy. Herald 291. 1856.

Cereus subinermis Hemsl. Biol. Centr. Amer. Bot. 1: 546. 1880.

Northern Mexico; type collected near Chihuahua.

At first simple, 10 to 12 cm. high, afterwards a little branching at base, when young pale green, afterwards bluish and finally darker green, erect; ribs 5 to 8, broad, somewhat sinuate; spines all radial, small, conic, 1 to 2 mm. long, yellow, 3 or 4, deciduous; flowers 5 to 7 cm. long, yellow; perianth segments oblanceolate, acute; spines of areoles on ovary and flower tube short, white.

14. **Echinocereus luteus** Britt. & Rose, Contr. U. S. Nat. Herb. 16: 239. 1913.

Sonora and Sinaloa; type from Alamos, Sonora.

Stem short to elongate, sometimes branching near base, bluish green, more or less purplish, 8 or 9-ribbed; ribs rather thin, barely undulate, rounded; areoles small, 10 to 12 mm. apart; spines small, the radials 6 to 8, unequal, 2 to 8 mm. long, widely spreading, white with darker tips; central spine single, porrect; areoles on ovary and flower tube bearing white wool and light-colored spines with dark tips; flowers pale yellow, sweet-scented, 7 cm. long; outer perianth segments streaked with red; inner perianth segments lemon-yellow, oblanceolate, acute.

15. **Echinocereus chloranthus** (Engelm.) Rümpler; Först. Handb. Cact. ed. 2. 814. 1885.

Cereus chloranthus Engelm. Proc. Amer. Acad. 3: 278. 1856.

Northern Mexico. Western Texas and southern New Mexico; type from El Paso.

Cylindric, usually simple, 8 to 15 cm. long, 5 to 7 cm. in diameter; ribs about 13, often nearly hidden by the densely set spines; areoles nearly circular; radial spines several, spreading; centrals 3 or 4, not angled, in a vertical row, one much more elongate than the others, 2 to 3 cm. long; flowers yellowish green, 2 cm. long; fruit nearly globular, 5 to 10 cm. long, dark purplish red, covered with small bristly spines; seeds black, dull, pitted, the hilum nearly basal, round.

16. **Echinocereus grandis** Britt. & Rose, Cactaceae 3: 18. 1922.

Islands of Baja California; type from San Esteban Island.

Stems usually single or in small clusters, subcylindric, 10 to 40 cm. high, 8 to 12 cm. in diameter; ribs 21 to 25, low; areoles large, longer than broad, about 1 cm. apart; spines dull white or cream-colored, rather short and stiff, the radials 15 to 25, the centrals 8 to 12, often in 2 rows; flower 5 to 6 cm. long, unusually narrow, with a short limb; ovary and flower tube densely clothed with clusters of pale straw-colored spines intermixed with white hairs; outer perianth segments white, with a green medial line, inner ones narrow, 1.5 cm. long, white with green bases; fruit densely spiny.

17. **Echinocereus dasyacanthus** Engelm. in Wisliz. Mem. North. Mex. 100. 1848.

Cereus dasyacanthus Engelm. in A. Gray, Pl. Fendl. 50. 1849.

Echinocereus spinosissimus Walton, Cact. Journ. 2: 162. 1899.

Echinocereus rubescens Dams, Monatsschr. Kakteenk. 15: 92. 1905.

Chihuahua. Western Texas and southern New Mexico; type from El Paso.

Plants usually simple, cylindric, 10 to 30 cm. high, very spiny; ribs 15 to 21, 2 to 3 cm. high; areoles 3 to 5 mm. apart, short-elliptic; radial spines 16 to 24, more or less spreading, 1.5 cm. long or less, at first pinkish but gray in age; central spines 3 to 8, a little stouter than the radials, never in a single row; flowers from near the apex, often 10 cm. long, yellowish, or drying reddish; outer perianth segments linear-oblong, 4 to 5 cm. long, acute, inner ones oblong, 5 cm. long; ovary very spiny; fruit nearly globular, 2.5 to 3.5 cm. in diameter, purplish, edible.

18. Echinocereus ctenoides (Engelm.) Rümpler; Först. Handb. Cact. ed. 2. 819. 1885.

Cereus ctenoides Engelm. Proc. Amer. Acad. 3: 279. 1856.

Chihuahua. Texas, the type from Eagle Pass.

So far as known simple, cylindric, elongate, 10 to 40 cm. long, 8 to 10 cm. in diameter, decidedly banded with pink and gray as in the rainbow cactus; ribs 15 to 17, low; areoles crowded together, short-elliptic; radial spines often as many as 20, not spreading but standing out at an angle to the ribs; central spines 8 to 10, arranged in a single row or sometimes a little irregular; flowers up to 10 cm. long, about as wide as long when fully expanded, bright to reddish yellow; ovary and fruit very spiny.

19. Echinocereus blanckii (Poselger) Palmer, Rev. Hort. 36: 92. 1865.

Cereus blanckii Poselger, Allg. Gartenz. 21: 134. 1853.

Cereus berlandieri Engelm. Proc. Amer. Acad. 3: 286. 1856.

Echinocereus poselgerianus Linke, Allg. Gartenz. 25: 239. 1857.

Echinocereus leonensis Mathsson, Monatsschr. Kakteenk. 1: 66. 1891.

Northeastern Mexico; type from Camargo, Tamaulipas. Southern Texas.

Procumbent; joints slender, 3 to 15 cm. long, 2 to 2.5 cm. in diameter; ribs 5 to 7, strongly tuberculate, or when turgid scarcely tubercled; areoles 1 to 1.5 cm. apart; radial spines 6 to 8, 8 to 10 mm. long, white; central spine solitary, 10 to 50 mm. long, brownish to black; flowers purple, 5 to 8 cm. long; perianth segments narrow, oblanceolate, acute. "Alicoche" (Tamaulipas).

20. Echinocereus pentalophus (DC.) Rümpler; Först. Handb. Cact. ed. 2. 774. 1885.

Cereus pentalophus DC. Mém. Mus. Hist. Nat. 17: 117. 1828.

Cereus propinquus DC.; Salm-Dyck, Allg. Gartenz. 1: 366. 1833.

Echinocereus leptacanthus Schum. Gesamtb. Kakt. 260. 1898.

Eastern Mexico. Southern Texas.

Procumbent, with ascending branches, deep green; ribs 4 to 6, somewhat undulate, bearing low tubercles; radial spines 4 or 5, very short, white with brown tips; central spine 1, rarely wanting; flowers reddish violet, 7 to 12 cm. long; perianth segments broad, rounded at apex; scales on the ovary and flower tube bearing long cobwebby hairs and brownish spines.

21. Echinocereus sciurus (K. Brandeg.) Britt. & Rose, Cactaceae 3: 22. 1922.

Cereus sciurus K. Brandeg. Zoe 5: 192. 1904.

Southern Baja California; type from San José del Cabo.

Densely cespitose, with many individuals forming clumps sometimes 60 cm. broad; stems slender, often 20 cm. long, often nearly hidden by the many spines; ribs 12 to 17, low, divided into numerous tubercles 5 to 6 mm. apart; areoles small, approximate, circular, at first woolly, becoming naked; radial spines 15 to 18, sometimes 15 mm. long, slender, pale except the brownish tips; centrals usually several, shorter than the radials; flowers described as 7 cm. long, about 9 cm. broad when fully open; inner perianth segments in 2 to 4 rows, bright magenta; seeds 1 mm. long, tuberculate.

22. **Echinocereus cinerascens**(DC.) Rümpler; Först. Handb. Cact. ed. 2. 786. 1885.

Cereus cinerascens DC. Mém. Mus. Hist. Nat. **17**: 116. 1828.
Cereus deppei Salm-Dyck, Hort. Dyck. 338. 1834.
Echinocereus cirrhiferus Rümpler; Först. Handb. Cact. ed. 2. 778. 1885.
Echinocereus glycimorphus Rümpler; Först. Handb. Cact. ed. 2. 800. 1885.
Central Mexico.

Growing in patches 60 to 120 cm. broad, branching at base, the stems ascending to about 30 cm.; ribs about 12, not very prominent, obtuse; areoles rather scattered, orbicular; spines white or pale, straight, rough, 1.5 to 2 cm. long; radials about 10; centrals 3 or 4; flowers 6 to 8 cm. long, the tube very short; scales on ovary and tube small, acute, their axils crowded with short white wool and 6 to 8 long white bristles; inner perianth segments, when dry, deep purple, 3 to 4 cm. long, obtuse.

23. **Echinocereus adustus** Engelm. in Wisliz. Mem. North. Mex. 104. 1848.

Echinocereus rufispinus Engelm. in Wisliz. Mem. North. Mex. 104. 1848.
Echinocereus radians Engelm. in Wisliz. Mem. North. Mex. 105. 1848.
Cereus adustus Engelm. in A. Gray, Pl. Fendl. 50. 1849.
Chihuahua; type from Cosihuiriachi.

Simple, short-cylindric, often only 4 to 6 cm. high; ribs 13 to 15; areoles closely set, elliptic; radial spines 16 to 20, appressed-pectinate, pale, the central spines wanting or solitary, sometimes elongate and porrect; flowers purplish, 3 to 4 cm. long; inner perianth segments narrow; ovary and calyx tube covered with clusters of short brown spines and long wool.

24. **Echinocereus reichenbachii** (Terscheck) Haage; Ind. Kew. **2**: 813. 1893.

Echinocactus reichenbachii Terscheck; Walp. Repert. Bot. **2**: 320. 1843.
Cereus caespitosus Engelm. Bost. Journ. Nat. Hist. **5**: 247. 1845.
Echinocereus caespitosus Engelm. in Wisliz. Mem. North. Mex. 110. 1848.
Cereus reichenbachianus Labouret, Monogr. Cact. 318. 1853.
Echinocereus rotatus Linke, Wochenschr. Gärtn. Pflanz. **1**: 85. 1858.
Northern Mexico. Texas.

More or less cespitose; stems simple, globose to short-cylindric, 2.5 to 20 cm. long, 5 to 9 cm. in diameter; ribs 12 to 19; areoles approximate, elliptic; spines 20 to 30, white to brown, pectinate, interlocking, 5 to 8 mm. long, spreading, more or less recurved; centrals 1 or 2, like the radials, or often wanting; flowers often 6 to 7 cm. long and fully as broad, light purple; perianth segments narrow, the margin more or less erose; fruit ovoid, about 1 cm. long; seeds black.

25. **Echinocereus rigidissimus** (Engelm.) Rose, Contr. U. S. Nat. Herb. **12**: 293. 1909.

Cereus pectinatus rigidissimus Engelm. Proc. Amer. Acad. **3**: 279. 1856.
Sonora. Southern Arizona.

Plants simple, erect, rigid, short-cylindric, 10 to 20 cm. high, 4 to 10 cm. in diameter, usually hidden by the closely set interlocking spines; ribs 18 to 22, low; areoles approximate, elliptic, 5 to 6 mm. long; radial spines about 16, gray to reddish brown, arranged in horizontal bands, pectinate, rigid, 15 mm. long or less, often recurved; central spines none; flowers purple, 6 to 7 cm. long, fully as broad when expanded; perianth segments oblong, 3 to 4 cm. long, acute; areoles on ovary somewhat floccose, very spiny; fruit globular, 3 cm. in diameter, very spiny; seeds black, tuberculate, 1.5 mm. in diameter. "Cabeza del viejo."

This species is often cultivated under the name of rainbow cactus.

26. **Echinocereus weinbergii** Weing. Monatsschr. Kakteenk. **22**: 83. 1912.

Probably a native of Mexico, but known only from cultivated plants.

Very stout, usually simple, at first globose, becoming conical, at least in cultivation, 13 cm. in diameter; ribs 15, acute, more or less undulate; areoles elliptic, approximate; radial spines 9 to 12, pectinate, 3 to 12 mm. long, at first white or rose but in age yellowish; central spines none; flowers diurnal, 3.6 cm. broad, rose-colored; inner perianth segments in several series, 1.5 to 3 cm. long, 4 to 5 mm. broad, lanceolate, acuminate.

27. **Echinocereus pectinatus** (Scheidw.) Engelm. in Wisliz. Mem. North. Mex. 109. 1848.

Echinocactus pectinatus Scheidw. Bull. Acad. Brux. **5**: 492. 1838.

Echinocactus pectiniferus Lem. Cact. Hort. Monv. 25. 1839.

Cereus pectinatus Engelm. in A. Gray, Pl. Fendl. 50. 1849.

Central Mexico; type from Villa del Peñasco.

Plants simple, erect, cylindric, 10 to 15 cm. long, 3 to 6 cm. in diameter, almost hidden by the many short interlocking spines; ribs 20 to 22, usually straight; areoles approximate, but not touching one another, elliptic, 3 mm. long; radial spines about 30, pectinate, usually much less than 10 mm. long, white or rose-colored, the colors more or less in bands about the plant; central spines several, more or less porrect; flowers purplish, 6 to 8 cm. long; areoles on ovary and flower tube felted, very spiny; fruit spiny, becoming naked, 2 to 3 cm. in diameter.

28. **Echinocereus scopulorum** Britt. & Rose, Cactaceae **3**: 30. 1922.

Sonora and Sinaloa; type from Guaymas, Sonora.

Stems single, cylindric, 10 to 40 cm. long, nearly hidden by the closely set spines; ribs 13 or more, low, somewhat tuberculate; areoles circular, devoid of wool (at least in areoles of the previous year); spines highly colored, pinkish or brownish with blackish tips, in age, however, gray and stouter; radials somewhat spreading; centrals 3 to 6, similar to the radials; flowers with a delicate rose perfume, widely spreading when fully expanded, 9 cm. broad; tube 2 cm. long, broadly funnelform, bearing greenish tubercles; inner perianth segments 4 cm. long, rose or purplish rose, much paler on the outside, sometimes nearly white, oblanceolate to spatulate, erosely dentate, acute.

29. **Echinocereus roetteri** (Engelm.) Rümpler; Först. Handb. Cact. ed. 2. 829. 1885.

Cereus roetteri Engelm. Proc. Amer. Acad. **3**: 345. 1856.

Echinocereus kunzei Gürke, Monatsschr. Kakteenk. **17**: 103. 1907.

Chihuahua. Texas and New Mexico; type from El Paso.

Cespitose, or perhaps sometimes simple and occasionally budding above, 10 to 25 cm. high; ribs 13, straight, more or less undulate; areoles circular, or a little longer than broad, about 1 cm. apart; radial spines 15 to 17, acicular, about 1 cm. long, white or purplish; central spines 1 to 5, not in a single row, a little stouter but scarcely longer than the radials; flowers appearing below the top of the plant, 6 to 7 cm. long, light purple; outer perianth segments greenish yellow; inner perianth segments oblanceolate, acute, 3 to 4 cm. long; ovary and fruit spiny.

30. **Echinocereus chlorophthalmus** (Hook.) Britt. & Rose, Contr. U. S. Nat. Herb. **16**: 242. 1913.

Echinocactus chlorophthalmus Hook. in Curtis's Bot. Mag. **74**: *pl. 4373*. 1848.

Known only from the type locality, Real del Monte, Hidalgo.

Cespitose, nearly globose, glaucous-green; ribs 10 to 12, somewhat tuberculate; areoles circular; radial spines 7 to 10, slender, needle-like, 12 to 18 mm. long, spreading; central spine one, stouter than the radials, the central as well as the radials pale brown but reddish at base when young; inner perianth segments spatulate, acute, somewhat serrate toward the tip, glossy above, purple, whitish at base; ovary and fruit spiny.

31. **Echinocereus knippelianus** Liebner, Monatsschr. Kakteenk. **5**: 170. 1895.
Echinocereus liebnerianus Carp. Balt. Cact. Journ. **2**: 262. 1896.
Echinocereus inermis Haage, Monatsschr. Kakteenk. **8**: 130. 1898.
Cereus knippelianus Orcutt, West. Amer. Sci. **13**: 27. 1902.
Native of Mexico, but range not known.

At first simple, stout, a little higher than broad, about 10 cm. high, but in cultivation elongate, 20 cm. high or more, branching, very deep green, becoming turgid and flabby; ribs 5 to 7, more prominent toward the top of the plant, sometimes strongly tuberculate, at other times only slightly sinuate; areoles minute, white-felted, 5 to 6 mm. apart; spines 1 to 3, weak, 3 to 6 mm. long, yellow; flowers pinkish, 2.5 to 3 cm. long; perianth segments spreading, oblanceolate, acute; fruit not known.

32. **Echinocereus pulchellus** (Mart.) Schum. in Engl. & Prantl, Pflanzenfam. **3**^{6a}: 185. 1894.
Echinocactus pulchellus Mart. Nov. Act. Nat. Cur. **16**: 342. 1828.
Cereus pulchellus Pfeiff. Enum. Cact. 74. 1837.
Probably in central Mexico; type said to have come from Pachuca, Hidalgo.

Stems obovate-cylindric, 5 to 7 cm. high, simple, glaucous; ribs 12, obtuse, more or less divided into tubercles; spines 3 to 5, short, straight, deciduous, yellowish; flowers rosy white, about 4 cm. broad; inner perianth segments lanceolate, acuminate.

33. **Echinocereus amoenus** (Dietr.) Schum. in Engl. & Prantl, Pflanzenfam. **3**^{6a}: 185. 1894.
Echinopsis amoena Dietr. Allg. Gartenz. **12**: 187. 1844.
Cereus amoenus Hemsl. Biol. Centr. Amer. Bot. **1**: 540. 1880.
San Luis Potosí.

Plants low, almost buried in the ground; ribs usually 13, low, somewhat tuberculate; young areoles bearing 6 to 8 rather stout short spreading spines; old areoles spineless; flowers about 5 cm. broad, magenta; inner perianth segments spatulate, with an ovate acute tip; areoles of the ovary and flower tube bearing brown spines and cobwebby wool.

34. **Echinocereus palmeri** Britt. & Rose, Cactaceae **3**: 34. 1922.
Type from the City of Chihuahua.

Plants 5 to 8 cm. high, 2 to 3 cm. in diameter; areoles closely set, round; radial spines 12 to 15, spreading, slender, brown-tipped; central spine one, porrect, 1.5 to 2 cm. long, brown to blackish; flower 3.5 cm. long, purple; areoles on the ovary bearing a cluster of brown spines and white wool.

35. **Echinocereus brandegeei** (Coulter) Schum. Gesamtb. Kakt. 290. 1898.
Cereus brandegeei Coulter, Contr. U. S. Nat. Herb. **3**: 389. 1896.
Cereus sanborgianus Coulter, Contr. U. S. Nat. Herb. **3**: 391. 1896.
Southern Baja California; type from Campo Alemán.

Always growing in clumps; joints sometimes one meter long or more, 5 cm. in diameter, but usually much narrowed toward the base; ribs strongly tubercled; areoles circular; spines at first light yellow tinged with red, in age

dark gray; radial spines about 12, spreading, acicular; central spines usually 4, very much stouter, more or less flattened, erect or porrect, the lowest one decidedly so, sometimes 8 cm. long; flowers purplish, about 5 cm. long; areoles on ovary and tube closely set, filled with pale acicular spines and long white wool; fruit globular, 3 cm. in diameter, spiny; seeds black, tuberculately roughened.

For an illustration of this species see Contr. U. S. Nat. Herb. 16: *pl. 124*.

36. **Echinocereus hempelii** Fobe, Monatsschr. Kakteenk. 7: 187. 1897.

Native of Mexico, but known only from cultivated plants.

Plant, so far as known, simple, erect, 15 cm. long or more, 6 to 7 cm. in diameter, dark green; ribs 10, strongly tuberculate; radial spines 6, spreading, white with brown tips, acicular, 1 cm. long or less; central spines none; flowers from near the top of plant, 6 to 8 cm. broad, violet; inner perianth segments about 14, loosely arranged, oblong, 3 cm. long, strongly toothed above; ovary bearing conspicuous red scales, spiny.

37. **Echinocereus merkeri** Hildmann; Schum. Gesamtb. Kakt. 277. 1898.

Cereus merkeri Berger, Rep. Mo. Bot. Gard. 16: 81. 1905.

Durango, Coahuila, and San Luis Potosí.

Cespitose; joints erect, 12 to 15 cm. in diameter, light green; ribs 8 or 9, sinuate; radial spines 6 to 9, white, shining; central spines 1 or rarely 2, often yellowish, larger than the radials, red at base; flowers purple, about 6 cm. long; inner perianth segments short-oblong, 3 cm. long, rounded at apex, sometimes mucronate; scales on ovary 2 to 3 cm. long, ovate, acuminate, bearing 2 to 5 long spiny bristles in their axils.

38. **Echinocereus fendleri** (Engelm.) Rümpler; Först. Handb. Cact. ed. 2. 801. 1885.

Cereus fendleri Engelm. in A. Gray, Pl. Fendl. 50. 1849.

Sonora and Chihuahua. Texas to Utah and Arizona; type from Santa Fe, New Mexico.

Cespitose; stems about 8, ascending or erect, 10 to 30 cm. long, 5 to 7.5 cm. in diameter; ribs rather prominent, 9 to 12, somewhat undulate; spines very variable as to color, length, and form; radial spines 5 to 10, more or less spreading, 1 to 2 cm. long, acicular to subulate; central spine solitary, usually porrect, 4 cm. long or less, dark-colored, often black-bulbose at base; flowers borne at the upper part of the plant, 10 cm. broad when fully expanded, but sometimes smaller, deep purple; inner perianth segments spatulate, 3 to 4 cm. long, acute, the margin sometimes serrulate; ovary deep green, its areoles bearing white felt and white bristly spines; fruit ovoid, 2.5 to 3 cm. long, purplish, edible; seeds 1.4 mm. long.

39. **Echinocereus enneacanthus** Engelm. in Wisliz. Mem. North. Mex. 112. 1848.

Cereus enneacanthus Engelm. in A. Gray, Pl. Fendl. 50. 1849.

Echinocereus carnosus Rümpler; Först. Handb. Cact. ed. 2. 796. 1885.

Northern Mexico; type from San Pablo, Chihuahua. New Mexico and Texas.

Cespitose, with many stems, often forming clumps one meter in diameter or more; joints often elongate, prostrate, 5 to 7 cm. in diameter; ribs 7 or 8, prominent, more or less tuberculate, somewhat flabby, dull green; areoles 2.5 cm. apart; radial spines unequal, usually less than 12 mm. long, acicular, at first yellowish, becoming brownish; central spine solitary, usually elongate,

nearly terete, 3 to 5 cm. long; flower purple, 7.5 cm. broad; perianth segments nearly oblong; fruit globular, juicy, edible.

Because of the delicious strawberry-like flavor of the fruit, this plant is known in Texas as strawberry cactus. The fruit is eaten raw and also used for making preserves.

40. **Echinocereus engelmannii** (Parry) Rümpler; Först. Handb. Cact. ed. 2. 805. 1885.

Cereus engelmannii Parry, Amer. Journ. Sci. II. 14: 338. 1852.

Sonora and Baja California. Utah and Arizona to California; type from San Felipe, California.

Cespitose, forming large clumps; joints erect or ascending, cylindric, 10 to 30 cm. long, 5 to 6 cm. in diameter; ribs 11 to 14, low, obtuse; areoles large, nearly circular; radial spines about 10, appressed, stiff, about 1 cm. long; central spines 5 or 6, very stout, more or less curved and twisted, terete or somewhat flattened, sometimes 7 cm. long, yellowish to brown, more or less variegated; flowers 5 to 8 cm. long, and even broader when fully expanded, purple; perianth segments oblong, 3 to 4 cm. long, acuminate; scales on ovary 3 to 5 mm. long, acuminate; areoles felted and bearing stout bristles; fruit ovoid to oblong, spiny, about 3 cm. long; seeds black, nearly globular, or a little oblique, 1.5 mm. in diameter or less, tuberculate.

41. **Echinocereus sarissophorus** Britt. & Rose, Cactaceae 3: 38. 1922.

Chihuahua and Coahuila; type from Saltillo, Coahuila.

Cespitose; stems short, thick, pale green, about 10 cm. thick; ribs 9; radial spines 7 to 10, slender; centrals several, 5 to 8 cm. long, often bluish, somewhat angled; flowers purplish, 7 to 8 cm. long; inner perianth segments broad; areoles on ovary and flower tube bearing short white wool and 3 to 5 long pale bristle-like spines; fruit globular, 2 to 3 cm. in diameter, covered with clusters of deciduous spines; seeds black.

42. **Echinocereus dubius** (Engelm.) Rümpler; Först. Handb. Cact. ed. 2. 787. 1885.

Cereus dubius Engelm. Proc. Amer. Acad. 3: 282. 1856.

Western Texas, the type from El Paso; doubtless also in Chihuahua.

Somewhat cespitose; stems 12 to 20 cm. long, pale green, of soft flabby texture, 7 to 9-ribbed; ribs broad; spines white; radial spines 5 to 8, 12 to 30 cm. long; centrals 1 to 4, 3.5 to 7.5 cm. long, angled, often curved; flowers pale purple, 6 cm. long or more, with rather few and narrow perianth segments; scales on flower tube bearing 1 to 3 white bristles in their axils; fruit very spiny, 2.5 to 3 cm. long; seeds covered with confluent tubercles.

43. **Echinocereus conglomeratus** Först. Gartenflora 39: 405. 1890.

Cereus conglomeratus Berger, Rep. Mo. Bot. Gard. 16: 81. 1905.

Nuevo León, Coahuila, and Zacatecas; type from Rinconada, near Monterrey, Nuevo León.

Cespitose, forming large clumps; joints simple, often half covered in the ground, 10 to 20 cm. long; ribs 11 to 13, slightly undulate; areoles 1 to 1.5 cm. apart, small, circular, slightly felted; spines white to brownish; radial spines acicular, 1.5 to 2.5 cm. long, spreading; central spines several, elongate, often 7 cm. long, very flexible; flowers 6 to 7 cm. long, broad and open, purplish; perianth segments broad, 2 cm. long; spines on ovary and flower long, white, more or less curved; fruit globular, 3 cm. in diameter, somewhat acid, edible; seeds numerous. "Pitahaya," "pitahaya de agosto," "alicoche."

44. Echinocereus stramineus (Engelm.) Rümpler; Först. Handb. Cact. ed. 2. 797. 1885.

Cereus stramineus Engelm. Proc. Amer. Acad. 3: 282. 1856.

Chihuahua. Western Texas and southern New Mexico; type from El Paso.

Plants grouped in masses forming immense mounds 1 to 2 meters in diameter and 30 to 100 cm. high; joints 12 to 25 cm. long, 3 to 7 cm. in diameter; ribs about 13, almost hidden by the long spines; spines at first brownish to straw-colored, in age nearly white; radial spines 7 to 14, 2 to 3 cm. long, spreading; central spines 3 or 4, 5 to 9 cm. long; flowers purple, 8 to 12 cm. long; perianth segments oblong, 3 to 4 cm. long, rounded at apex; spines from the axils of scales on ovary and flower tube, 2 to 5, short, white; fruit nearly globular, 3 to 4 cm. in diameter, red, spiny at first, becoming glabrous, edible; seeds 1.5 mm. in diameter, somewhat oblique. "Pitahaya."

45. Echinocereus barthelowanus Britt. & Rose, Cactaceae 3: 41. 1922.

Type from Santa María Bay, Baja California.

Plants cespitose, forming large clusters; stems cylindric, 10 to 20 cm. long, 4 to 5 cm. in diameter; ribs about 10, somewhat tuberculate below, but completely hidden by the stout numerous spines; areoles 2 to 5 mm. apart, white-felted when young; spines numerous, acicular, sometimes 7 cm. long, pinkish when quite young, afterwards white or yellow with brown or blackish tips, in age becoming gray; flowers only 10 to 12 mm. long; perianth segments oblong, 3 to 4 mm. long; ovary minute, strongly tubercled, hidden under the mass of spines; spine clusters on ovary with 6 to 12 white or pinkish-tipped spines, half as long as the flower.

46. Echinocereus mamillatus (Engelm.) Britt. & Rose, Cactaceae 3: 41. 1922.

Cereus mamillatus Engelm.; Coulter, Contr. U. S. Nat. Herb. 3: 405. 1896.

Southern Baja California; type from Mulegé.

Cespitose; stems ascending, 20 to 30 cm. long, cylindric, 3.5 to 6 cm. in diameter; ribs 20 to 25, sometimes oblique, strongly tuberculate; spines white or pinkish; radial spines 10 to 25, acicular, 3 to 12 mm. long; central spines 3 or 4, much stouter than the radials, 1 to 2.5 cm. long.

This and the following species are omitted from the key because their characters are still imperfectly known.

47. Echinocereus ehrenbergii (Pfeiff.) Rümpler; Först. Handb. Cact. ed. 2. 775. 1885.

Cereus ehrenbergii Pfeiff. Allg. Gartenz. 8: 282. 1840.

Central Mexico.

Cespitose, 20 cm. high; joints often procumbent, pale or leaf-green; ribs 6, obtuse, sinuate; areoles 2 cm. apart, white-felted; radial spines 8 to 10, slender, white; central spines 3 or 4, yellowish at base.

48. Echinocereus longisetus (Engelm.) Rümpler; Först. Handb. Cact. ed. 2. 822. 1885.

Cereus longisetus Engelm. Proc. Amer. Acad. 3: 280. 1856.

Coahuila; type from Santa Rosa.

Plants simple or nearly so, cylindric, 15 to 25 cm. long, 5 to 7.5 cm. in diameter; ribs 11 to 14, somewhat tubercled; areoles circular; spines slender, elongate, white; radial spines 18 to 20, spreading, the lower 10 to 15 mm. long, much longer than the upper; central spines 5 to 7, very unequal, the lower elongate, 2.5 to 5.5 cm. long, deflexed; flowers said to be red.

26. ARIOCARPUS Scheidw. Bull. Acad. Brux. 5: 491. 1838.

Plants spineless, usually simple, low, with flat or round top; tubercles tough, horny, or cartilaginous, triangular, imbricate, spirally arranged, the lower part tapering into a claw, the upper or bladelike part expanded; areoles terminal or at the bottom of a triangular groove near the middle of tubercle, filled with hair when young; flowers appearing from near the center on young tubercles, diurnal, rotate-campanulate, white to purple; fruit oblong, smooth; seeds black, tuberculately roughened, with a large basal hilum; embryo described as obovate, straight.

The following are the only species known:

Tubercles not grooved on upper side----------1. A. retusus.
Tubercules grooved on the upper side.
Plants small, 3 to 5 cm. broad----------2. A. kotschoubeyanus.
Plants large, 10 to 15 cm. broad----------3. A. fissuratus.

1. **Ariocarpus retusus** Scheidw. Bull. Acad. Brux. 5: 492. 1838.
Anhalonium prismaticum Lem. Cact. Hort. Monv. 1. 1839.
Anhalonium retusum Salm-Dyck, Cact. Hort. Dyck. 1844. 15. 1845.
Anhalonium elongatum Salm-Dyck, Cact. Hort. Dyck. 1849. 77. 1850.
Anhalonium areolosum Lem. Illustr. Hort. Lem. 6: Misc. 35. 1859.
Anhalonium pulvilligerum Lem. Illustr. Hort. Lem. 16: Misc. 72. 1869.
Mamillaria areolosa Hemsl. Biol. Centr. Amer. Bot. 1: 503. 1880.
Mamillaria elongata Hemsl. Biol. Centr. Amer. Bot. 1: 509. 1880.
Mamillaria prismatica Hemsl. Biol. Centr. Amer. Bot. 1: 519. 1880.
Mamillaria furfuracea S. Wats. Proc. Amer. Acad. 25: 150. 1890.
Anhalonium trigonum Weber, Dict. Hort. Bois 90. 1893.
Coahuila, Zacatecas, and San Luis Potosí.

Plants globular or more or less depressed, usually 10 to 12 cm. broad, grayish green to purplish, very woolly at the center; tubercles horny, imbricate, 5 cm. long or less, ovate, more or less 3-angled, acute to acuminate, often with a woolly areole on the upper side near the tip and this sometimes spinescent; flowers borne at the axils of young tubercles near the center, white or nearly so, up to 6 cm. long; outer perianth segments pinkish, narrow, acute to acuminate; inner perianth segments at first white, afterwards pinkish, narrowly oblanceolate, with mucronate tip; fruit oblong, white, naked; seeds globular, 1.5 mm. in diameter, black, tuberculate-roughened. "Chaute," "chautle."

According to Ochoterena, the name "peyote" is sometimes erroneously applied to this species.

2. **Ariocarpus kotschoubeyanus** (Lem.) Schum. in Engl. & Prantl, Pflanzenfam. Nachtr. 259. 1897.
Anhalonium kotschoubeyanum Lem. Bull. Cercl. Confér. Hort. Seine. 1842.
Anhalonium sulcatum Salm-Dyck, Cact. Hort. Dyck. 1849. 5. 1850.
Central Mexico.

Plants grayish green, 3 to 5 cm. broad, only the flat crown appearing above the surface of the ground, with a thickened fleshy rootstock, and with several spindle-shaped roots from the base; upper part of tubercle flattened, triangular, 6 to 8 mm. long, grooved along its middle almost to the tip, the groove very woolly; flowers 2.5 to 3 cm. long, originating in the center of the plant from the axils of the young tubercles, surrounded by a cluster of hairs; outer perianth segments few, brownish, obtuse; inner perianth segments up to 2 cm. long, oblanceolate, obtuse or apiculate, sometimes retuse, rose-colored to light purple, widely spreading; ovary naked; seeds oblong, 1 mm. long. "Pezuña de venado" (Nuevo León).

This species was first collected by Karwinsky, who sent to Germany three plants of it about 1840. One of these plants is said to have been sold for 1,000 francs.

3. **Ariocarpus fissuratus** (Engelm.) Schum. in Engl. & Prantl, Pflanzenfam. 3[6a]: 195. 1894.

Mammillaria fissurata Engelm. Proc. Amer. Acad. 3: 270. 1856.

Anhalonium fissuratum Engelm. U. S. & Mex. Bound. Cact. 75. 1859.

Ariocarpus lloydii Rose, Contr. U. S. Nat. Herb. 13: 308. 1911.

Coahuila and Zacatecas. Western Texas, the type collected near the mouth of the Pecos River.

Plant body scarcely appearing above the ground, flat or somewhat rounded, sometimes 15 cm. broad; tubercles imbricate, ovate, the upper part 2 to 3 cm. broad at base, acute or obtuse, the whole surface more or less fissured and irregularly warty; areoles filled with a dense mass of hairs; flowers 3 to 4 cm. broad, white to purple; inner perianth segments oblong-oblanceolate; fruit oval, pale green, 10 mm. long; seeds black, tuberculate-roughened. "Chaute," "chautle," "peyote cimarrón."

The name "peyote" is said to be sometimes incorrectly applied to this species.

27. LOPHOPHORA Coulter, Contr. U. S. Nat. Herb. 3: 131. 1894.

A single species is known.

1. **Lophophora williamsii** (Lem.) Coulter, Contr. U. S. Nat. Herb. 3: 131. 1894.

Echinocactus williamsii Lem.; Salm-Dyck, Allg. Gartenz. 13: 385. 1845.

Anhalonium williamsii Lem.; Först. Handb. Cact. ed. 2. 233. 1885.

Anhalonium lewinii Hennings, Gartenflora 37: 410. 1888.

Lophophora lewinii Thompson, Rep. Mo. Bot. Gard. 9: 133. 1898.

Central and eastern Mexico. Southern Texas.

Plants dull bluish green, globular to top-shaped or somewhat flattened at top, 5 to 8 cm. broad, with a thickened tap-root sometimes 10 cm. long or more; ribs 7 to 13, nearly vertical or irregular and indistinct, tubercled; flowers central, each surrounded by a mass of long hair, in color pale pink to white, 2.5 cm. broad when fully open, with a broad funnelform tube; outer perianth segments nearly white; style white below, pinkish above, shorter than the perianth segments; stigma lobes 5, linear, pinkish; ovary naked; fruit 2 cm. long or less; seeds 1 cm. in diameter, with a broad basal hilum. "Peyote"; "hikuli" (Huichol and Tarahumare); "kamaba" (Tepehuane, *Ochoterena*); "señí," "wokowi" (Querétaro, *Ramírez*).

This is a well-known plant in Mexico, and an account of it was published by Sahagún in the sixteenth century. The peyote contains a narcotic substance that has been the subject of much study with regard to its chemical and physiological properties. The name anhalonin has been given to a supposed alkaloid separated from the plant, but other persons claim that the narcotic properties are due to the presence of certain resinous bodies.

The dried plants have been in use among the native people since precolumbian times, and are still employed, although their use is forbidden by law. Eating a piece of the dried plant results in remarkable visions and hallucinations, and the general effects are somewhat like those resulting from the use of hashish.[1]

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[1] See Manuel Urbina, El peyote y el ololiuhqui, Anal. Mus. Nac. Méx. 7: 25–48. *pl. 1.* 1900.

28. **EPITHELANTHA** Weber; Britt, & Rose, Cactaceae 3: 92. 1922.

A single species is known.

1. Epithelantha micromeris (Engelm.) Weber; Britt. & Rose. Cactaceae 3: 93. 1922.

Mammillaria micromeris Engelm. Proc. Amer. Acad. 3: 260. 1856.
Mammillaria micromeris greggii Engelm. Proc. Amer. Acad. 3: 261. 1856.
Mammillaria greggii Safford, Ann. Rep. Smiths. Inst. 1908: 531. 1909.
Northern Mexico. Western Texas.

Plants small, simple or cespitose, nearly globular, but depressed at apex, 6 cm. in diameter or less; tubercles very low, small, arranged in many spirals, 1 mm. long; spines numerous, white, the lower radials about 2 mm. long, the upper radials on the young tubercles 6 to 8 mm. long and connivent over the apex, narrowly clavate, the upper half finally falling off; flowers from near the center of the plant in a tuft of wool and spines; flower very small, whitish to light pink, 6 mm. broad; perianth segments 8 to 10; stamens 10 to 15; stigma lobes 3; fruit 8 to 12 mm. long; seeds 1.5 mm. broad.

The fruits, known as "chilotes," are slightly acid and edible.

29. **HAMATOCACTUS** Britt. & Rose, Cactaceae 3: 104. 1922.

A single species is known.

1. Hamatocactus setispinus (Engelm.) Britt. & Rose, Cactaceae 3: 104. 1922.

Echinocactus setispinus Engelm. Bost. Journ. Nat. Hist. 5: 246. 1845.
Echinocactus muehlenpfordtii Fennel, Allg. Gartenz. 15: 65. 1847.
Echinocactus hamatus Mühlenpf. Allg. Gartenz. 16: 18. 1884. Not *E. hamatus* Forbes. 1837.
Echinocactus hamulosus Regel, Ind. Sem. Hort. Petrop. 34. 1856.
Echinopsis nodosa Linke, Wochenschr. Gärtn. Pflanz. 1: 85. 1858.
Echinocactus nodosus Hemsl. Biol. Centr. Amer. Bot. 1: 535. 1880.
Northern Mexico. Southern Texas, the type collected along the Colorado River.

Plants up to 15 cm. high, with long fibrous roots; ribs usually 13, more or less oblique, thin, high, undulate on the margin; radial spines 12 to 16, slender, often 4 cm. long, some white, others brownish; central spines 1 to 3, longer than radials; flower 4 to 7 cm. long, yellow, with a red center; inner perianth segments oblong, acute, widely spreading; fruit 8 mm. in diameter, nearly naked; seeds 1.2 to 1.6 mm. in diameter.

30. **STROMBOCACTUS** Britt. & Rose, Cactaceae 3: 106. 1922.

A single species is known.

1. Strombocactus disciformis (DC.) Britt. & Rose, Cactaceae 3: 106. 1922.

Mammillaria disciformis DC. Mém. Mus. Hist. Nat. 17: 114. 1828.
Echinocactus turbiniformis Pfeiff. Allg. Gartenz. 6: 275. 1838.
Mammillaria turbinata Hook. in Curtis's Bot. Mag. 69: *pl. 3984*. 1843.
Echinocactus disciformis Schum. in Engl. & Prantl, Pflanzenfam. 3^{6a}: 189. 1894.
Central Mexico; type from Mineral del Monte, Hidalgo.

Plants small, depressed, turbinate or semiglobose, 5 to 6 cm. broad; tubercles somewhat chartaceous, imbricate, more or less winged, bearing 1 to 4 white acicular spines when young, naked when old; young areoles with white wool, naked in age; flowers from center of plant, 2 cm. long or less; scales and outer perianth segments dark red, with whitish margins; inner perianth seg-

ments white, lanceolate, acute, spreading; filaments much shorter than the inner perianth segments, purple; stigma lobes about 7, long, twisted; ovary naked except at top, small; fruit 7 mm. long; seeds 3 mm. in diameter.

31. **LEUCHTENBERGIA** Hook. in Curtis's Bot. Mag. 74: *pl. 4393.* 1848.

A single species is known.

1. **Leuchtenbergia principis** Hook. in Curtis's Bot. Mag. 74: *pl. 4393.* 1848. Central and northern Mexico; type from Real del Monte, Hidalgo.

Plants up to 50 cm. high, 5 to 7 cm. in diameter, with a large or branched tap-root, often 12 cm. long; tubercles erect, ascending or widely spreading, very woolly in their axils, bluish green, 10 to 12.5 cm. long, more or less 3-angled, nearly truncate at apex, gradually dying off below and leaving broad scars on the trunk; spines papery, thin; radial spines 8 to 14, about 5 cm. long; central spines 1 or 2, sometimes 10 cm. long; flowers lasting for several days, fragrant, solitary, from just below the tips of the young tubercles, more or less funnelform, the limb when widely expanded 10 cm. broad; outer perianth segments reddish with a brown stripe down the middle; inner perianth segments oblong, acute, serrate at apex; stamens and style somewhat exserted; stigma lobes 9 to 12, linear; fruit probably dry; seeds dark brown, minutely tuberculate.

The plants are said to be employed as a remedy for wounds in beasts of burden.

32. **ECHINOFOSSULOCACTUS** Lawrence; Loud. Gard. Mag. 17: 317. 1841.

Mostly rather small plants, rarely over 10 cm. in diameter, but generally much smaller, usually solitary, rarely clustered, deep-seated in the ground, globular or depressed, or very old plants becoming short-cylindric; ribs usually numerous, in one species as few as 10, in other 50 to 100, usually very thin, more or less wavy; areoles on each rib sometimes only 1 or 2, always felted when young; spines in numerous clusters often covering the plant, some of them strongly flattened and ribbon-like; flowers small, campanulate to subrotate with a very short tube; stamens numerous, shorter than the perianth segments; scales on the perianth and ovary few to numerous, scarious, naked in their axils; fruit globular to short-oblong, bearing a few papery scales, these perhaps deciduous in age; seeds black with a broad basal truncate hilum.

All the species of the genus are natives of Mexico.

Ribs thick at base, triangular in cross-section.
  Ribs 10 to 14 ---- **1. E. coptonogonus.**
  Ribs about 35 ---- **2. E. hastatus.**
Ribs always numerous, very thin, even at base.
  Ribs 100 or more ---- **3. E. multicostatus.**
  Ribs 25 to 55.
    Radial spines all or partly acicular.
      Upper radial spines, like the others, acicular, white, straight.
        Flowers greenish yellow.
          Central spines terete ---- **4. E. wippermannii.**
          Central spines narrow but flattened ---- **5. E. heteracanthus.**
        Flowers not greenish yellow.
          Central spines 4 ---- **6. E. albatus.**
          Central spines 3.
            Central spines annulate; apex of plant not depressed. **7. E. lloydii.**
            Central spines not annulate; apex of plant umbilicate. **8. E. zacatecasensis.**

Upper radial spines subulate, some of them flattened.
Spines all yellow or white.
Spines 5 or 6----9. E. lamellosus.
Spines 8 to 11----10. E. grandicornis.
Spines partly (central and upper ones) brownish----11. E. arrigens.
Radial spines never acicular.
Perianth segments much elongate and widely spreading or recurved.
20. E. lancifer.
Perianth segments rather short.
Spines all appressed against the plant----12. E. violaciflorus.
Spines partly erect or porrect.
Ribs about 25.
Spines partly (four upper ones) much elongate.
13. E. obvallatus.
Spines all similar.
Spines 5----14. E. pentacanthus.
Spines 10 or more----15. E. crispatus.
Ribs 30 or more.
Radial spines white----16. E. dichroacanthus.
Radial spines brown.
Flowers purplish----17. E. anfractuosus.
Flowers yellow.
Upper and flattened spines 3, rather short, red.
18. E. tricuspidatus.
Upper and flattened spines usually 1, rarely 2.
19. E. phyllacanthus.

1. **Echinofossulocactus coptonogonus** (Lem.) Lawrence; Loud. Gard. Mag. 17: 317. 1841.

Echinocactus coptonogonus Lem. Cact. Aliq. Nov. 23. 1838.

Reported from San Luis Potosí and Hidalgo.

Simple or perhaps cespitose, globular or a little depressed, 7 to 10 cm. high, glaucous-green; ribs stout, 1.5 cm. high, 10 to 14, acute; areoles about 2 cm. apart, when young abundantly floccose, but in age naked; spines 3 to 5, stout, a little incurved, the longest 3 cm. long, flattened; flowers 3 cm. long, 4 cm. broad; inner perianth segments numerous, linear-oblong, acute, purple with white margins; ovary brownish violet, bearing thin scales.

2. **Echinofossulocactus hastatus** (Hopffer) Britt. & Rose, Cactaceae 3: 111. 1922.

Echinocactus hastatus Hopffer; Schum. Gesamtb. Kakt. 376. 1898.

Hidalgo.

Simple, depressed-globose, 10 cm. high, 12 cm. in diameter; ribs 35, triangular in section, light green, somewhat crenate; radial spines 5 or 6, very short, straight, yellow, the upper ones flattened, often 3 cm. long; central spine solitary, 4 cm. long, porrect; flowers white (the largest in this genus); fruit becoming dry; seeds obovate, 1.5 mm. long, brownish gray, shining, finely punctate.

3. **Echinofossulocactus multicostatus** (Hildemann) Britt. & Rose, Cactaceae 3: 111. 1922.

Echinocactus multicostatus Hildemann; Mathsson, Gartenflora 39: 465. 1890.

Eastern Mexico; type said to have come from Saltillo, Coahuila.

Simple, usually globose, but sometimes depressed, 6 to 10 cm. in diameter; ribs 100 or more, very thin, wavy, each bearing only a few areoles; areoles

pubescent when young; spines usually 6 to 9, divided into two classes, the 3 upper spines elongate, 4 to 8 cm. long, erect or ascending, flexible, rather thin but not very broad, yellowish to brownish; lower spines spreading, weak-subulate, 5 to 15 mm. long; flowers 2.5 cm. long; outer perianth segments oblong, acuminate; inner perianth segments oblong, acute or obtuse; scales on the flower tube oblong, acuminate; scales on the ovary broadly ovate, acute to acuminate, very thin, more or less papery, early deciduous.

4. **Echinofossulocactus wippermannii** (Mühlenpf.) Britt. & Rose, Cactaceae 3: 111. 1922.

Echinocactus wippermannii Mühlenpf. Allg. Gartenz. 14: 370. 1846.

Hidalgo.

Simple, obovoid, 15 cm. high, 5 to 6 cm. in diameter, dull green; ribs 35 to 40, compressed, slightly undulate; areoles 12 mm. apart, hairy when young, glabrate in age; radial spines 18 to 22, setaceous, white, 15 mm. long; central spines 3 or 4, erect, elongate, 2 to 5 cm. long, subulate, terete, blackish; flowers 1.5 mm. long, dull yellow.

5. **Echinofossulocactus heteracanthus** (Mühlenpf.) Britt. & Rose, Cactaceae 3: 112. 1922.

Echinocactus heteracanthus Mühlenpf. Allg. Gartenz. 13: 345. 1845.

Echinocactus tetraxiphus Otto; Schum. Gesamtb. Kakt. 363. 1898.

Hidalgo, the type from Real del Monte.

Globose to short-cylindric, light green, nearly hidden by the closely set spines; ribs 30 to 34, much compressed, somewhat undulate; areoles white, hairy when young; radial spines 11 to 13 (16 to 18, according to Schumann), acicular, white, spreading; central spines 4, brownish to flesh-colored, more or less annulate, compressed; flowers greenish yellow (according to Schumann).

6. **Echinofossulocactus albatus** (Dietr.) Britt. & Rose, Cactaceae 3: 112. 1922.

Echinocactus albatus Dietr. Allg. Gartenz. 14: 170. 1846.

Mexico, but range not known.

Simple, depressed-globose, 10 to 12 cm. in diameter, glaucous, the apex covered with spines; ribs about 35, flat, undulate; spines yellowish white; radial spines 10, setaceous, 1 cm. long; central spines 4, the uppermost flat and annulate, the central terete, porrect; flowers white, 2 cm. long.

7. **Echinofossulocactus lloydii** Britt. & Rose, Cactaceae 3: 113. 1922.

Zacatecas.

Nearly globular, 12 cm. in diameter or more, crowned by the long overtopping connivent spines; ribs very numerous, thin, more or less folded; areoles brown, woolly when young; radial spines acicular, 10 to 15, white, 2 to 8 mm. long, spreading; central spines 3, light brown, much elongate, somewhat incurved and connivent, the two lateral ones similar and not so papery, the middle one very thin, annulate, 4 to 9 cm. long; flowers small, nearly white; outer perianth segments with a green stripe on the midvein; inner perianth segments thin, narrowly oblong, acute; scales on the ovary ovate, acute, very thin.

8. **Echinofossulocactus zacatecasensis** Britt. & Rose, Cactaceae 3: 113. 1922.

Zacatecas.

Plants solitary, globular, 8 to 10 cm. in diameter; ribs pale green, very thin, about 55; radial spines 10 to 12, spreading, acicular, white, 8 to 10 mm. long; central spines 3, brownish, 2 of them terete, but the middle one flattened,

erect or connivent, longer than the other 2, sometimes 3 to 4 cm. long, never annulate; flowers 3 to 4 cm. broad, nearly white; inner perianth segments linear-oblong, with an ovate apiculate tip, slightly tinged with lavender, 15 mm. long; scales on the ovary broadly ovate, apiculate, scarious.

9. **Echinofossulocactus lamellosus** (Dietr.) Britt. & Rose, Cactaceae **3**: 113. 1922.

Echinocactus lamellosus Dietr. Allg. Gartenz. **15**: 177. 1847.

Hidalgo.

Subglobose to short-cylindric, more or less depressed at apex; ribs about 30, strongly flattened, more or less undulate; areoles remote, tomentose when young; spines 5 or 6, white with brown tips; flowers tubular, 3.5 to 4 cm. long; inner perianth segments linear to linear-lanceolate, acute.

10. **Echinofossulocactus grandicornis** (Lem.) Britt. & Rose, Cactaceae **3**: 114. 1922.

Echinocactus grandicornis Lem. Cact. Hort. Monv. 30. 1839.

Mexico, the range not known.

Plants simple, globose to slender-cylindric, 10 cm. high, 5 to 6 cm. in diameter, glaucous-green, the apex hidden by the spines; ribs 34 or 35, much compressed, acute, undulate; areoles only a few to each rib, tomentose when young, naked in age; spines 8 to 11, at first yellowish; upper spines erect, stout, flat, 5 cm. long, the 2 lateral ones not so stout, a little shorter and nearly terete, the other spines slender; flowers whitish purple.

11. **Echinofossulocactus arrigens** (Link) Britt. & Rose, Cactaceae **3**: 114. 1922.

Echinocactus arrigens Link; Dietr. Allg. Gartenz. **8**: 161. 1840.

Echinocactus sphaerocephalus Mühlenpf. Allg. Gartenz. **14**: 370. 1846.

Echinocactus allardtianus Dietr. Allg. Gartenz. **15**: 178. 1847.

Mexico, the range not known.

Plant simple, deep-seated in the soil, globular, 5 to 7 cm. in diameter, glaucescent, more or less depressed at apex; ribs 24, thin and wavy; spines 8 to 11, yellow; uppermost spine elongate, 2 to 4 cm. long, flattened, brownish; central spines 2 or 3, more slender and not quite so long as the uppermost one; radial spines 6 to 8, acicular, usually pale, spreading; flowers small, 2 to 2.5 cm. long; inner perianth segments oblong, apiculate, with deep purple stripe down the center and with pale, nearly white margins.

The following species have been referred here by some authors: *Echinocactus xiphacanthus* Miquel (Linnaea **12**: 1. 1838); *E. ensiferus* Lem. (Cact. Aliq. Nov. 26. 1838); *Echinofossulocactus ensiformis* Lawrence (Loud. Gard. Mag. **17**: 317. 1841).

12. **Echinocactus violaciflorus** (Quehl) Britt. & Rose, Cactaceae **3**: 114. 1922.

Echinocactus violaciflorus Quehl, Monatsschr. Kakteenk. **22**: 102. 1912.

Zacatecas (type locality) and Aguascalientes.

Simple, at first globose, but becoming columnar, 8 to 10 cm. in diameter; ribs about 35, thin, deeply crenate; spines about 7, the 4 or 5 lower ones 7 to 12 mm. long, appressed or incurved, white, subulate, the 3 upper spines flattened, 3 to 6 cm. long, ascending and the uppermost ones connivent over the top of the plant; flowers 2 to 2.5 cm. long; perianth segments narrow, acuminate, white with violet or purplish stripe down the middle; scales on the ovary more or less imbricate, in 3 or 4 rows, broadly ovate, apiculate with scarious margins.

13. **Echinofossulocactus obvallatus** (DC.) Lawrence in Loud. Gard. Mag. **17**: 317. 1841.

Echinocactus obvallatus DC. Prodr. **3**: 462. 1828.

Hidalgo.

Obovoid to globose, depressed at apex; ribs about 25, rather thin and undulate; spines about 8, 4 spines subulate, ascending or spreading, 4 spines short, perhaps not one-fourth the length of the longer ones; flowers central, very large; perianth segments linear-oblong.

14. **Echinofossulocactus pentacanthus** (Lem.) Britt. & Rose, Cactaceae **3**: 115. 1922.

Echinocactus pentacanthus Lem. Cact. Aliq. Nov. 27. 1883.

Echinocactus biceras Jacobi, Allg. Gartenz. **16**: 370. 1848.

Reported from San Luis Potosí and Hidalgo.

Simple, depressed-globose to short-cylindric, more or less glaucous; ribs about 25, perhaps even 40 to 50; areoles only a few to the rib; spines 5, unequal, grayish red, hardly angled, flattened; 3 upper spines erect or spreading; 2 lower spines much slenderer and shorter than the upper; flowers large for this group, deep violet; perianth segments with white margins.

15. **Echinofossulocactus crispatus** (DC.) Lawrence in Loud. Gard. Mag. **17**: 317. 1841.

Echinocactus crispatus DC. Prodr. **3**: 461. 1828.

Reported from Hidalgo.

Plants obovoid, somewhat depressed at apex; ribs about 25, more or less folded, somewhat undulate; spines 10 or 11, rigid, unequal; flowers central, rather small; perianth segments in 2 series, purplish, oblong-linear, acute; flower tube covered with imbricate scales.

The following species have been referred here by some authors: *Echinocactus flexispinus* Salm-Dyck (Cact. Hort. Dyck. 1849. 159. 1850); *E. undulatus* Dietr. (Allg. Gartenz. **12**: 187. 1844.

16. **Echinofossulocactus dichroacanthus** (Mart.) Britt. & Rose, Cactaceae **3**: 117. 1922.

Echinocactus dichroacanthus Mart.; Pfeiff. Enum. Cact. 62. 1837.

Hidalgo.

Plant obovoid, dull green, 15 cm. high, 10 cm. in diameter, somewhat umbilicate at apex; ribs 32, thin, acute, undulate, somewhat wavy; areoles only a few on each rib, white-tomentose; upper spines 3, erect, flattened, purplish; radial spines 4 to 6, white.

17. **Echinofossulocactus anfractuosus** (Mart.) Lawrence in Loud. Gard. Mag. 17: 317. 1841.

Echinocactus anfractuosus Mart.; Pfeiff. Enum. Cact. 63. 1837.

Hidalgo.

Plant simple, somewhat longer than broad, 12.5 cm. long, 6 cm. in diameter, dull green; ribs many (about 30, according to Schumann), compressed, wavy, each bearing only a few areoles; spines somewhat curved, straw-colored with brown tips; radial spines 7, stout, the 3 upper radials much larger, about 3 cm. long, the 4 lower radials slender; central spine solitary, 2.5 cm. long, brownish; perianth segments purple with white margins.

18. **Echinofossulocactus tricuspidatus** (Scheidw.) Britt. & Rose, Cactaceae **3**: 117. 1922.

Echinocactus tricuspidatus Scheidw. Allg. Gartenz. **9**: 51. 1841.

Echinocactus melmsianus Wegener, Allg. Gartenz. **12**: 65. 1844.

San Luis Potosí.

Globose to short-cylindric, 5 to 8 cm. broad; ribs numerous, 30 to 55, thin, wavy; areoles at first lanate, afterwards naked; spines 5, the upper one thin, compressed, sometimes 3-toothed at apex, 8 to 33 mm. long, reddish with a black tip, the other 4 spines spreading, more or less appressed, straight or recurved, gray or reddish with black tips, much shorter than the upper one; flowers greenish yellow, 1.5 cm. long; inner perianth segments short-oblong, obtuse, the outer ones more or less acute or apiculate; scales on the ovary broadly ovate with a scarious margin and a more or less prominent cusp.

19. **Echinofossulocactus phyllacanthus** (Mart.) Lawrence in Loud. Gard. Mag. **17**: 317. 1841.

Echinocactus phyllacanthus Mart. Allg. Gartenz. 4: 201. 1836.

Echinocactus phyllacanthoides Lem. Cact. Hort. Monv. 28. 1839.

Central Mexico.

Simple, depressed-globose to short-cylindric, 3 to 15 cm. high, 4 to 10 cm. in diameter, dull green; ribs 30 to 35, thin, undulate; areoles only a few to a rib, white-tomentose when young; spines 5 to 9; upper spine, or rarely 2 spines, much elongate, erect or connivent over the top of the plant, flattened, thin, somewhat annulate, 4 cm. long; other spines weak-subulate, usually pale and spreading; flowers 15 to 20 mm. long, yellowish; inner perianth segments acute.

20. **Echinofossulocactus lancifer** (Dietr.) Britt. & Rose, Cactaceae **3**: 118. 1922.

Echinocactus lancifer Dietr. Allg. Gartenz. **7**: 154. 1839.

Echinocactus dietrichii Heynhold, Nom. **2**: 92. 1846.

Mexico, the locality not known.

Nearly ovoid, somewhat depressed at apex; ribs numerous, strongly compressed, undulate; areoles few to each rib, when young tomentose; spines 8, white or brownish at apex, some of them broad and flat; flowers rather large, rose-colored; flower tube described as long; perianth segments linear-oblong, widely spreading.

21. **Echinofossulocactus gladiatus** (Link & Otto) Lawrence in Loud. Gard. Mag. **17**: 317. 1841.

Echinocactus gladiatus Link & Otto, Wochenschr. Ver. Beförd. Gartenb. **3**: 426. 1827.

Probably native of eastern Mexico.

Plant glaucescent, ovoid to oblong, 12.5 cm. high, 10 cm. in diameter with a depressed apex covered with connivent spines; ribs prominent, rather broad, obtuse, 14 to 22; spines 10, gray, 4 upper spines subulate, of these 3 usually ascending, the central spreading or porrect, the largest 5 cm. long, 4 lower spines acicular.

22. **Echinofossulocactus confusus** Britt. & Rose, Cactaceae **3**: 120. 1922.

Native of Mexico, the range not known.

Simple, pale green, stout, columnar to short-clavate, 6 to 15 cm. high, 6 to 8 cm. in diameter; ribs 26 to 30, thin, low, wavy; areoles 4 or 5 on each rib, 2 to 3 cm. apart; spines all yellow, subulate; radial spines 4 or 5, only slightly flattened, 7 to 10 mm. long; central spine solitary, up to 4 cm. long, usually porrect; flowers purplish, 4 cm. broad; perianth segments oblong, acute.

The following species of *Echinocactus* are perhaps referable to *Echinofossulocactus*, but they are still imperfectly unknown: *E. acanthion* Salm-Dyck, *E. acroacanthus* Stieber, *E. adversispinus* Mühlenpf., *E. brachycentrus* Salm-Dyck, *E. cereiformis* DC., *E. debilispinus* Berg, *E. ellemeetii* Berg, *E. flexuosus*

Dietr., *E. fluctuosus* Dietr., *E. foersteri* Stieber, *E. griseispinus* Jacobi, *E. hexacanthus* Mühlenpf., *E. heyderi* Dietr., *E. hookeri* Mühlenpf., *E. hystrichocentrus* Berg, *E. linkeanus* Dietr., *E. macrocephalus* Mühlenpf., *E. mammillifer* Miquel, *E. ochroleucus* Jacobi, *E. octacanthus* Mühlenpf., *E. quadrinatus* Wagener, *E. raphidacanthus* Salm-Dyck, *E. raphidocentrus* Jacobi, *E. sulphureus* Dietr., *E. teretispinus* Lem., *E. tribolacanthus* Monville, *E. trifurcatus* Jacobi.

33. FEROCACTUS Britt. & Rose, Cactaceae 3: 123. 1922.

Globular to cylindric, often large cacti; ribs thick and prominent; spines well developed, either straight or hooked; areoles usually large, bearing flowers only when young and then only just above the spine clusters, more or less felted when young; flowers usually large, broadly funnel-shaped to campanulate, usually with a very short tube; stamens numerous, borne on the throat, short; ovary and flower tube very scaly; scales naked in their axils; fruit oblong, usually thick-walled and dry, dehiscing by a large basal pore; seeds black, pitted, never tuberculate; embryo curved.

Besides the species here listed, one other is known, a native of the southwestern United States. The species of *Ferocactus* are well known in the arid regions of Mexico and the United States because of their large size and abundance, and the varied uses made of them. In the United States they are usually known by the name barrel cactus. By the Indians they were sometimes employed as cooking vessels, the interior being scooped out and mashed, and the water thus obtained being replaced in the cavity and heated with hot stones, after which meat and other substances were placed in the liquid and cooked. The liquid obtained by crushing the pulp has sometimes been used as a substitute for water in the desert. The pulp is often fed to horses and cattle.

The candied pulp makes an excellent sweetmeat, which is much used in Mexico and the southwestern United States, and is often sold in the eastern United States as "cactus candy." The Papago Indians of Arizona are reported to have prepared a sweetmeat by boiling the pulp in the syrup of *Carnegiea gigantea.*

The usual Mexican name for plants of the genus is "biznaga" or "viznaga." The name *biznaga* is applied in Spain to the parsnip (*Pastinaca sativa*), and the word is of Arabic origin. The Mexican word, however, is believed to have been derived from the Nahuatl, *huitzli*, spine, and *nahuac*, around, i. e., covered with spines. Concerning these plants Robelo[1] writes as follows: "It is well known that the Mexicans in their bloody and gloomy religion performed the rite of sacrificing their flesh, drawing blood from the ears, thighs, arms, and legs, nose, and even the tongue. For such sacrifices they employed the spines of the *biznaga* and *metl* [maguey]; and these objects being consecrated or even deified, the biznaga founded a cult, which was personified by a deity, Huitznahuatl, to whom was erected a temple, Huitznahua-teapan, and to the place where the spines were kept was given the name Huitzcalco." The Mexicans also used the name *teocomitl*, "divine vessel," for the plants; while Hernández mentions the "comitl," "tepenexcomitl," and "hueycomitl," all of which probably belong to this genus. The biznaga was sacred to the god Mixcoatl.

Buelna reports the Otomí name as "pe," and the name "caballuña" is reported for an unidentified species.

Clavigero gives a description of one one of the species of *Ferocactus* occuring in Baja California, and says: "In New Spain some people use the spines for

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[1]Anal. Mus. Nac. II. 2: 375. 1905.

toothpicks, and in some of the missions of California they employed them for knitting stockings, straightening out the tips and reducing the thicker part. Among these spines the *viznaga* produces its handsome flowers, tinged with white, red, and yellow, which are followed by the fruit, much smaller than that of the *tammiá*, and full, like that of the *cardón*, with viscous juice and seeds, which latter the Californians eat, after preparing them like those of the *cardón*. In Mexico they make a good sweetmeat from the juicy pulp of the *viznaga*." Clavigero also makes the following shrewd statement, which indicates that he had no mean knowledge of plants: "It is certainly wonderful that the plants of which I have spoken, and others of which I shall speak later, have more juice in arid places than other kinds of trees have in humid regions; but it is still more remarkable that they maintain themselves without any deterioration with little or no dew, although it may not rain for 10 months or more, as often happens in California. I believe that these plants are more juicy because they transpire less, inasmuch as they have no leaves, for these, as is the fundamental belief of physicists, are the principal organs of tranpiration among plants: it may be conjectured that the Creator denied these plants leaves because He destined them to inhabit dry lands."

Plants very large, often 1 meter high or more (except apparently nos. 2, 4, and 5).
Areoles with a marginal row of bristles or hairs.
Areoles with weak marginal hairs.
Central spines yellowish; flowers yellow----------1. **F. stainesii.**
Central spines bright red; flowers red----------2. **F. pringlei.**
Areoles with marginal bristles.
Central spines hooked.
Central spines up to 12 cm. long and 8 mm. wide----7. **F. horridus.**
Central spines 8 cm. long or less, 4 to 6 mm. wide.
Inner perianth segments pink.
Inner perianth segments linear----------3. **F. fordii.**
Inner perianth segments oblong----------4. **F. townsendianus.**
Innner perianth segments yellow to red, the outer pinkish.
Inner perianth segments about 2 cm. long; spines yellow to red. **5. F. chrysacanthus.**
Inner perianth segments 4 to 5 cm. long; spines white to reddish. **6. F. wislizeni.**
Central spines straight or more or less curved but not hooked.
Central spines flexible, thin.
Central spines more or less appressed; seeds less than 2 mm. long. **8. F. lecontei.**
Central spines more or less tortuous and spreading; seeds more than 3 mm. long----------9. **F. acanthodes.**
Central spines dagger-like, straight, erect--------10. **F. santa-maria.**
Areoles without marginal hairs or bristles.
Spines all alike----------11. **F. diguetii.**
Spines unlike, the radials different from the central.
Central spines more or less hooked.
Central spine one----------12. **F. covillei.**
Central spines 4----------13. **F. peninsulae.**
Central spines not hooked.
Flowers lemon-yellow; inner perianth segments elongate. **14. F. rectispinus.**
Flowers crimson; perianth segments all short--------15. **F. orcuttii.**

Plants much smaller, 60 cm. or less in diameter, sometimes forming large clumps.
Areoles with stout spines and weak bristles----16. F. robustus.
Areoles with stout spines only.
Spines never hooked.
Spines all straight.
Scales on ovary linear, with long-ciliate margins---20. F. flavovirens.
Scales on ovary broader than linear, not with long-ciliate margins.
Flowers 4 to 5 cm. long; plants green.
Plants flattened; ribs acute; margin of scales of ovary not ciliate----17. F. echidne.
Plants rounded; ribs obtuse; margin of scales of ovary ciliate.----18. F. alamosanus.
Flowers 2 cm. long; plants glaucous----19. F. glaucescens.
Spines more or less curved.
Flowers 3.5 cm. long or less; ribs up to 24----21. F. melocactiformis.
Flowers larger; ribs fewer.
Scales on ovary acute----22. F. macrodiscus.
Scales on ovary obtuse----23. F. viridescens.
Spines, at least some of them, hooked or recurved at the tip.
Central spines, or one of them, broad and short.
Central spine solitary----24. F. nobilis.
Central spines several.
Radial spines all straight----25. F. latispinus.
Radial spines on lower side of areoles hooked-26. F. crassihamatus.
Central spines slender and elongate.
Flowers large, yellow----27. F. hamatacanthus.
Flowers small, pinkish to brownish----28. F. uncinatus.

1. **Ferocactus stainesii** (Hook.) Britt. & Rose, Cactaceae 3: 124. 1922.
Echinocactus stainesii Hook.; Audot, Rev. Hort. 6: 248. 1845.
Echinocactus pilosus Galeotti; Salm-Dyck, Cact. Hort. Dyck. 1849. 148. 1850.
San Luis Potosí.

Simple or proliferous, globular, up to 1.5 meters high; ribs 13 to 20, compressed, more or less undulate; areoles distant, circular; radial spines reduced to long white hairs; central spines several, subulate, at first purplish, becoming pale yellow in age; flowers yellow.

2. **Ferocactus pringlei** (Coulter) Britt. & Rose, Cactaceae 3: 125. 1922.
Echinocactus pilosus pringlei Coulter, Contr. U. S. Nat. Herb. 3: 365. 1896.
Echinocactus pringlei Rose, Contr. U. S. Nat. Herb. 10: 127. 1906.
Coahuila and Zacatecas; type from Jimulco, Coahuila.

Growing in clumps, becoming cylindric, sometimes 3 meters high and 30 to 40 cm. in diameter; ribs usually 16 to 18, more or less compressed; areoles numerous, closely set or contiguous, the outer margin with a row of white or straw-colored hairs 2 to 4 cm. long; spines red, the three lower ones slender, almost acicular, the innermost much stouter, somewhat flattened, angular, curved or nearly straight; flowers red without, yellow within, 2.5 cm. long; scales on the ovary numerous, orbicular, imbricate; inner perianth segments oblanceolate, obtuse or apiculate; fruit yellow, somewhat succulent, dehiscing by a basal pore, 3 to 4 cm. long, crowned by the persisting perianth; seeds 1.5 mm. long, brownish, pitted, with a small basal hilum. "Biznaga colorada" (Zacatecas).

3. **Ferocactus fordii** (Orcutt) Britt. & Rose, Cactaceae 3: 126. 1922.
Echinocactus fordii Orcutt, Rev. Cact. 1: 56. 1899.
Baja California, the type from Lagoon Head.

Globose to short-cylindric, grayish green, 12 cm. in diameter; ribs usually 21, about 1 cm. high; areoles about 2 cm. apart; radial spines whitish, acicular, widely spreading, about 15; central spines usually 4; one of the centrals flattened, porrect, longer than the others, with a curved or hooked tip, about 4 cm. long, the others subulate, somewhat angled; flowers rose-colored, 3.5 to 4 cm. long; outer perianth segments ovate to ovate-oblong, acute; inner perianth segments linear, acuminate; scales on the ovary broadly ovate.

4. **Ferocactus townsendianus** Britt. & Rose, Cactaceae 3: 127. 1922.
Type from San Josef Island, Baja California.

Short-cylindric, 40 cm. high or more; ribs about 16, often spiraled, somewhat undulate; areoles large, distant; radial spines widely spreading, 14 to 16, 3 to 4 cm. long, most of them threadlike, but often 2 or more above and below subulate; central spines subulate, grayish, usually one curved or hooked at apex, the others straight, all annulate; flowers 5 to 6 cm. long; outer perianth segments ovate, reddish, with narrow yellow margins; inner perianth segments oblong-lanceolate with a narrow pink stripe down the center with greenish yellow margins.

5. **Ferocactus chrysacanthus** (Orcutt) Britt. & Rose, Cactaceae 3: 127. 1922.
Echinocactus chrysacanthus Orcutt, Rev. Cact. 1: 56. 1899.
Baja California; type from Cedros Island.

Globose to cylindric; ribs about 18, tubercled; radial spines 4 to many, slender, white; central spines sometimes as many as 10, 5 cm. long, either red or yellow, curved; flowers from near the center of the plant, 5 cm. broad when fully open; scales naked in the axils, closely set and overlapping, the lower one orbicular and green, the upper ones more oval, brownish or with brown tips, the margin thin, sometimes ciliate or ragged; outer perianth segments rather stiff, pinkish brown; inner perianth segments 2 cm. long, satiny yellow with a jagged or toothed margin; fruit yellow, 3 cm. long; seeds large, black.

6. **Ferocactus wislizeni** (Engelm.) Britt. & Rose, Cactaceae 3: 127. 1922.
Echinocactus wislizeni Engelm. in Wisliz. Mem. North. Mex. 96. 1848.
Echinocactus emoryi Engelm. in Emory, Mil. Reconn. 157. 1848.
Echinocactus falconeri Orcutt, West Amer. Sci. 12: 162. 1902.

Chihuahua, Sonora, and Sinaloa. Texas to Arizona; type from Dona Ana, New Mexico.

At first globular but becoming cylindric, when very old, 2 meters long or more, usually simple, but when injured often giving off several heads or branches; ribs numerous, often 25, 3 cm. high; areoles elliptic, sometimes 2.5 cm. long, brown-felted, 2 to 3 cm. apart, or the flowering ones often approximate; spines variable; radials absent in young plants, threadlike to acicular, the longest 5 cm. long; central spines several, white to red, annular, all subulate, one of them much stouter, usually strongly flattened, strongly hooked; flowers yellow, some red, 5 to 6 cm. long; fruit yellow, oblong, scaly, 4 to 5 cm. long; seeds dull black, the surfaces covered with shallow indistinct pits. "Biznaga."

The Pima Indians of Arizona ate the flesh of the plant after cutting it in strips and boiling it.

7. **Ferocactus horridus** Britt. & Rose, Cactaceae 3: 128. 1922.

Type from San Francisquito Bay, Baja California.

Globular, 30 cm. in diameter or more; ribs 13, broad, 2 cm. high, obtuse, not tubercled; areoles 1.5 to 2.5 cm. apart, large; radial spines 8 to 12, acicular, spreading, white, 3 to 4 cm. long; central spines 6 to 8, very diverse, all reddish, either spreading or porrect, all straight except 1, this much elongate, often 12 cm. long, much flattened, very strongly hooked.

8. **Ferocactus lecontei** (Engelm.) Britt. & Rose, Cactaceae 3: 129. 1922.

Echinocactus lecontei Engelm. Proc. Amer. Acad. 3: 274. 1856.

Sonora and Baja California. Utah, Arizona, and southern California.

Becoming cylindric, 2 meters high or more, rather slender; ribs 20 to 30, somewhat undulate; areoles longer than broad; some of the radial spines threadlike or bristly, the other radials and the central spines flattened and flexible, usually appressed against the plant, most of them ascending, rarely if ever hooked, white to red; flowers originally described as yellow, also reported as red, 5 to 6 cm. long; fruit oblong, yellow; seeds minute, less than 2 mm. long, black, shiny, reticulate, slightly compressed.

9. **Ferocactus acanthodes** (Lem.) Britt. & Rose, Cactaceae 3: 129. 1922.

Echinocactus acanthodes Lem. Cact. Hort. Monv. 106. 1839.

Echinocactus cylindraceus Engelm. Proc. Amer. Acad. 3: 275. 1856.

Northern Baja California. Nevada and southern California.

At first globular but in age cylindric, sometimes nearly 3 meters high, very spiny; ribs often as many as 27, acute, 1 to 2 cm. high; areoles 1 cm. in diameter or more, densely brown-felted when young, closely set, often nearly contiguous; spines often white or pinkish or sometimes bright red; radial spines weak, setiform or acicular, usually pungent, often spreading; central spines subulate, slender, spreading, more or less flattened, annulate, tortuous and more or less curved, but never hooked at tip, the longest 10 to 12 cm. long; flowers yellow to orange, 4 to 6 cm. long, usually broader than long; scales on ovary and flower tube imbricate, ovate, with a large purple blotch on their back, gradually passing upward into the perianth segments; inner perianth segments glossy, narrowly oblong to spatulate, obtusish, often toothed; fruit oblong, 3 cm. long, crowned by the scaly perianth, dry, dehiscing by a basal pore; seeds black, 3.5 mm. long, pitted.

10. **Ferocactus santa-maria** Britt. & Rose, Cactaceae 3: 131. 1922.

Type from Santa María Bay, Baja California.

Cylindric, 60 cm. high or more; ribs about 14; outer spines several, threadlike; central spines in 2 series, all straight, grayish, annulate, subulate, the central one stouter, flatter, ascending, somewhat curved at tip; old flowers persisting, 6 to 7 cm. long; fruit 3 to 4 cm. long, bearing orbicular scales; seeds 2 mm. long, finely reticulate.

11. **Ferocactus diguetii** (Weber) Britt. & Rose, Cactaceae 3: 131. 1922.

Echinocactus diguetii Weber, Bull. Mus. Hist. Nat. 4: 100. 1898.

Islands of the Gulf of California; type from Santa Catalina Island.

Plants very stout, usually 1 to 2 meters but sometimes 4 meters, high, 60 to 80 cm. in diameter or more; ribs sometimes as many as 39, rather thin; areoles 1 to 1.5 cm. long, somewhat elliptic, approximate or on old plants coalescent; spines 6 to 8, yellow, subulate, 3 to 4 cm. long, slightly curved and a little spreading; flowers numerous, 3 to 3.5 cm. long; scales on ovary and flower tube ovate, closely imbricate, thin on the margin and somewhat lacerate; inner perianth segments red with yellow margins, oblong, 2 cm. long; tube of flower below stamens very short; fruit scaly. "Biznaga."

12. Ferocactus covillei Britt. & Rose, Cactaceae 3: 132. 1922.

Sonora, the type from Altar. Southern Arizona.

Plant simple, globular to short-cylindric, often 1.5 meters high; ribs 22 to 32, 2 to 4 cm. high, rather thin, when young more or less tubercled, but when old hardly undulate; areoles on small plants distant, often 3 to 4 cm. apart, on old and flowering plants approximate or contiguous, densely brown-felted when young, naked in age, the spine-bearing areoles large and circular, the flowering areoles more elongate and complex, divided into three parts, the lower part bearing spines, the central part spinescent bands, and the upper part the flower; spines sometimes red to white; radial spines 5 to 8, somewhat spreading, subulate, straight or more or less curved backward, 3 to 6 cm. long, annulate; central spine always solitary, very variable, straight or with the tip bent or even strongly hooked, annulate, terete to strongly flattened or 3-angled, 3 to 8 cm. long; upper areoles of old plants bearing 5 to 7 glands, becoming spinescent, 5 to 6 mm. long; flowers described as red, tipped with yellow, sometimes reported as yellow throughout, 6 to 7 cm. long; inner perianth segments linear-oblong, acuminate, often serrate; fruit oblong, 5 cm. long, bearing a few broad scales; seeds black, dull or shining, nearly smooth or slightly pitted, 2 mm. long.

13. Ferocactus peninsulae (Weber) Britt. & Rose, Cactaceae 3: 133. 1922.

Echinocactus peninsulae Weber, Bull. Mus. Hist. Nat. 1: 320. 1895.

Southern Baja California.

Simple, erect, 2.5 meters high, clavate to cylindric; ribs 12 to 20, prominent; areoles 4 cm. apart or even less in old plants; spines red with yellow tips; radial spines 11, spreading, straight, terete, more or less annulate, the lower ones stouter and more colored; central spines 4.

14. Ferocactus rectispinus (Engelm.) Britt. & Rose, Cactaceae 3: 134. 1922.

Echinocactus emoryi rectispinus Engelm.; Coulter, Contr. U. S. Nat. Herb. 3: 362. 1896.

Echinocactus rectispinus Britt. & Rose, Journ. N. Y. Bot. Gard. 12: 269. 1911.

Central Baja California; type from Mulegé.

Globose to cylindric, 1 to 2 meters high; radial spines 8 to 12, the three upper spines stouter and sometimes curved; central spine one, 9 to 13 cm. long, rather slender, nearly straight, never hooked; flowers 6 cm. long, yellowish; scales on ovary rounded, thin-margined, sometimes ciliate, naked in the axils; inner perianth segments lemon-yellow, lanceolate, 5 cm. long, acuminate.

15. Ferocactus orcuttii (Engelm.) Britt. & Rose, Cactaceae 3: 134. 1922.

Echinocactus orcuttii Engelm. West. Amer. Sci. 2: 46. 1886.

Type from Palm Valley, Baja California.

Single, or cespitose in clusters of 15 to 20 stems, 60 to 130 cm. high, 25 to 45 cm. in diameter; ribs 13 to 30, somewhat spiraled, obtuse, somewhat tuberculate; areoles approximate; spines reddish, straight or simply curved, all annulate, angled or flat; radial spines 9 to 13, spreading; central spines 4, stouter than the radials; flower 3 to 5 cm. long, dull crimson; perianth segments short-oblong, rounded at apex with a more or less erose margin; scales on the ovary orbicular, small; fruit described as pulpy, crimson, scaly; seeds numerous, small.

16. Ferocactus robustus (Link & Otto) Britt. & Rose, Cactaceae 3: 135. 1922.

Echinocactus robustus Link & Otto, Allg. Gartenz. 1: 364. 1833.

Puebla, the type from Tehuacán.

In large clumps, often 3 meters, rarely 5 meters in diameter, 1 to 1.3 meters high, with hundreds of branches; ribs 8, prominent in young growth, but be-

coming indistinct in age, somewhat undulate; areoles brown-felted when young; radial spines ascending, about 10, often threadlike; central spines subulate, about 6, brown at first, somewhat flattened, annulate, often 6 cm. long; flowers 3.5 to 4 cm. long; inner perianth segments oblong, acute, yellowish; scales on ovary broad, rounded at tip; fruit 2 to 2.5 cm. long; seeds black, oblong, 1.5 mm. long.

17. Ferocactus echidne (DC.) Britt. & Rose, Cactaceae **3**: 136. 1922.

Echinocactus echidne DC. Mém. Cact. 19. 1834.

Echinocactus vanderaeyi Lem. Cact. Aliq. Nov. 20. 1838.

Echinocactus dolichanthus Lem. Cact. Aliq. Nov. 25. 1838.

Echinocactus gilvus Dietr. Allg. Gartenz. **13**: 170. 1845.

Echinocactus victoriensis Rose, Contr. U. S. Nat. Herb. **12**: 291. 1909.

Tamaulipas to Hidalgo; type from Hidalgo.

Depressed-globose, 12.5 cm. high, 18 cm. in diameter, green; ribs 13, acute, broad at base; areoles remote, velvety when young, oval; radial spines rigid, about 7, about 2 cm. long, yellow; central spine solitary, porrect, 3 cm. long or more; flowers lemon-yellow; perianth segments linear-oblong, acute, sometimes toothed near apex; scales on the ovary ovate, acute. "Biznaga" (Tamaulipas).

18. Ferocactus alamosanus Britt. & Rose, Cactaceae **3**: 137. 1922.

Echinocactus alamosanus Britt. & Rose, Contr. U. S. Nat. Herb. **16**: 239. 1913.

Sonora, the type from Alamos.

Plants usually single, sometimes in clusters, somewhat flattened above, green, 30 cm. in diameter or more; ribs about 20, narrow; spines all yellow; radials usually 8, 3 to 4 cm. long, more or less spreading; central single, porrect or erect, somewhat flattened laterally, 6 cm. long and a little longer than the radials; flower buds covered with ovate ciliate scales, these brownish except in the margin.

19. Ferocactus glaucescens (DC.) Britt. & Rose, Cactaceae **3**: 137. 1922.

Echinocactus glaucescens DC. Mém. Mus. Hist. Nat. **17**: 115. 1828.

Echinocactus pfeifferi Zucc.; Pfeiff. Enum. Cact. 58. 1837.

Eastern central Mexico; type from Tolimán.

Globular, 20 to 40 cm. in diameter, or a little higher than broad, glaucous; ribs 11 to 15, somewhat flattened, acute, 2 to 3 cm. high; areoles 8 to 12 mm. apart, oblong, 12 to 20 mm. long, yellowish, tomentose when young; radial spines 6, nearly equal, rigid, only slightly spreading, straight, 2.5 to 3 cm. long, pale yellow at first, when old blackish, more or less banded; central spine solitary, similar to the radials; flowers yellow, 2 cm. long, perhaps broader when fully expanded; outer perianth segments ovate, acuminate, sometimes brownish on the back, ciliate; inner perianth segments oblong, usually only acute, somewhat toothed or lacerate; scales on the ovary brownish, ovate, acute, ciliate, imbricate.

20. Ferocactus flavovirens (Scheidw.) Britt. & Rose, Cactaceae **3**: 138. 1922.

Echinocactus flavovirens Scheidw. Allg. Gartenz. **9**: 50. 1841.

Vicinity of Tehuacán, Puebla.

Plant cespitose, forming great masses, pale green, 30 to 40 cm. high; stems 10 to 20 cm. in diameter; ribs 13, rarely 11 or 12, 1 to 2 cm. high, acute, somewhat sinuate; areoles 2 cm. apart, large, grayish, woolly; spines pale brown, becoming gray in age, long and stout; centrals 4, much longer than the radials, somewhat unequal, the longer ones 5 to 8 cm. long; flower buds globular, covered with long linear imbricate scales, their margins ciliate with long hairs.

21. Ferocactus melocactiformis (DC.) Britt. & Rose, Cactaceae 3: 138. 1922.

Echinocactus melocactiformis DC. Prodr. 3: 462. 1828.

Echinocactus histrix DC. Mém. Mus. Hist. Nat. 17: 115. 1828.

Echinocactus coulteri Don, Hist. Dichl. Pl. 3: 162. 1834.

Echinocactus oxypterus Zucc.; Pfeiff. Enum. Cact. 57. 1837.

Echinocactus electracanthus Lem. Cact. Aliq. Nov. 24. 1838.

Echinocactus lancifer Reichenb.; Terscheck, Cat. Suppl. 2.

Eastern Mexico.

Simple, cylindric, 50 to 60 cm. in diameter, bluish green; ribs about 24; areoles 2 to 3 cm. apart; spines usually 10 to 12, a little curved, yellow, becoming brown, of these 6 to 8 slender-subulate, 2 to 3 cm. long, more or less spreading, 3 or 4 spines more central than the others, but usually only one definitely so, much stouter and longer, 4 to 6 cm. long, porrect or ascending, annulate; flowers 2.5 to 3.5 cm. long, bright yellow, sometimes reddish without; inner perianth segments linear-oblong, acute, somewhat spreading; scales on the ovary ovate, acute, small, 2 to 4 mm. long, somewhat ciliate; fruit short-oblong, about 2 cm. long, somewhat edible; seeds minute, 1 mm. long, brown. "Biznaga costillona" (Durango, *Patoni*).

22. Ferocactus macrodiscus (Mart.) Britt. & Rose, Cactaceae 3: 139. 1922.

Echinocactus macrodiscus Mart. Nov. Act. Nat. Cur. 16: 341. 1832.

San Luis Potosí and southward.

Simple, depressed-globose or sometimes short-cylindric, sometimes 45 cm. in diameter; ribs 16, perhaps more in some specimens, somewhat flattened, sometimes acute, somewhat depressed at the distant areoles; spines all yellow, more or less curved backward; radial spines 6 to 8, mostly 2 to 3 cm. long; central spines 4, stouter and flatter than the radials, 3.5 cm. long; flowers 5 cm. long, dark red to purple, obconic; inner perianth segments linear-oblong, acute.

23. Ferocactus viridescens (Torr. & Gray) Britt. & Rose, Cactaceae 3: 140. 1922.

Echinocactus viridescens Torr. & Gray, Fl. N. Amer. 1: 554. 1840.

Echinocactus limitus Engelm.; Coulter, Contr. U. S. Nat. Herb. 3: 374. 1896.

Northern Baja California. Southern California, the type from San Diego.

At first nearly globose or somewhat depressed, in age becoming cylindric, 30 to 45 cm. high, 25 to 35 cm. in diameter, simple or cespitose, deep green, somewhat glossy; ribs 13 to 21, somewhat rounded, 1 to 2 cm. high, obtuse, undulate; areoles narrow, elliptic, 1 to 2 cm. long, spine-bearing in the lower part, felted in upper part, flower-bearing and also with several reddish glands, these becoming elongate and spinescent in age; spines at first bright red, becoming duller by age or turning yellow or horn-colored; radial spines 9 to 20, more or less spreading, 1 to 2 cm. long; central spines 4, the lower one stouter and more flattened, up to 3.5 cm. long; flowers yellowish green, 4 cm. long; perianth segments oblong, obtuse, sometimes apiculate, more or less serrulate; scales on the ovary orbicular, imbricate; fruit 1.6 to 2 cm. long, reddish, with a pleasant acid taste; seeds 1.6 mm. long, pitted.

24. Ferocactus nobilis (L.) Britt. & Rose, Cactaceae 3: 141. 1922.

Cactus nobilis L. Mant. Pl. 243. 1767.

Cactus recurvus Mill. Gard. Dict. ed. 8. *Cactus* no. 3. 1768.

Echinocactus recurvus Link & Otto, Wochenschr. Ver. Beförd. Gartenb. 3: *pl. 20.* 1827.

Echinocactus spiralis, Karw.; Pfeiff. Enum. Cact. 60. 1837.

Echinocactus curvicornis Miquel, Linnaea **12**: 5. 1838.
Echinocactus stellatus Scheidw. Allg. Gartenz. **8**: 338. 1840.
Echinocactus solenacanthus Scheidw. Allg. Gartenz. **9**: 50. 1841.
Eastern Mexico.

Globular; ribs 15; radial spines straight, widely spreading; central spine solitary, erect, 7 cm. long, broad and flat, recurved at tip, brownish red; flowers 2.5 to 4 cm. long; perianth segments narrow, acute, red with white margins; ovary covered with ovate imbricate scales; fruit short, oblong, 2 cm. long, 12 mm. in diameter.

25. Ferocactus latispinus (Haw.) Britt. & Rose, Cactaceae **3**: 143. 1922.
Cactus latispinus Haw. Phil. Mag. **63**: 41. 1824.
Echinocactus cornigerus DC. Mém. Mus. Hist. Nat. **17**: 36. 1828.
Echinocactus latispinus Hemsl. Biol. Centr. Amer. Bot. **1**: 533. 1880.
Widely distributed in Mexico.

Plant simple, globular or somewhat depressed, 25 to 40 cm. high, 40 cm. in diameter; ribs 15 to 23, but usually 21, prominent; areoles large; radial spines 6 to 10, slender, annulate, white to rose, 2 to 2.5 cm. long; central spines 4 or more, stouter and more highly colored than the radials, all straight except one, this much flattened and hooked; flowers campanulate, 2.5 to 3.5 cm. long, rose to purple; perianth segments narrowly oblong, acute; scales on ovary closely imbricate, thin and papery, ovate, with thin ciliate margins; scales on flower tube similar to those on ovary but more elongate; fruit elongate, 4 cm. long; seeds described as reniform, slightly pitted, 1.5 mm. long. "Biznaga de chilitos" (Durango, Oaxaca); "biznaga ganchuda" (Zacatecas, *Patoni*).

26. Ferocactus crassihamatus (Weber) Britt. & Rose, Cactaceae **3**: 144. 1922.
Echinocactus crassihamatus Weber, Dict. Hort. Bois 468. 1896.
Echinocactus mathssonii Berger, Monatsschr. Kakteenk. **7**: 76. 1897.
Querétaro.

Simple, globose to short-cylindric, pale green, somewhat glaucous; ribs 13, rather prominent, obtuse, strongly undulate; areoles large, only a few on each rib; radial spines 8, spreading, the upper ones straight, 2 or 3 of the lower ones hooked; central spines 5, longer and stouter than the radials, usually red, the stoutest one porrect and hooked; flowers about 2 cm. long, purple; inner perianth segments linear-oblong, acute.

27. Ferocactus hamatacanthus (Mühlenpf.) Britt. & Rose, Cactaceae **3**: 144. 1922.
Echinocactus hamatacanthus Mühlenpf. Allg. Gartenz. **14**: 371. 1846.
Echinocactus flexispinus Engelm. in Wisliz. Mem. North. Mex. 111. 1848.
Echinocactus longihamatus Galeotti; Pfeiff. Abbild. Beschr. Cact. **2**: *pl. 16.* 1848.
Echinocactus sinuatus Dietr. Allg. Gartenz. **19**: 345. 1851.
Echinocactus treculianus Labour. Monogr. Cact. 202. 1853.
Echinocactus flavispinus Meinsh. Wochenschr. Gärtn. Pflanz. **1**: 28. 1858.
Echinocactus haematochroanthus Hemsl. Biol. Centr. Amer. Bot. **1**: 532. 1880.
Northern Mexico. Texas and New Mexico.

Solitary, globular to oblong, up to 60 cm. high; ribs usually 13, sometimes 17, strongly tubercled, 2 to 3 cm. high; areoles large, 1 to 3 cm. apart; radial spines about 12, acicular, terete, 5 to 7 cm. long; central spines 4, elongate, angled, sometimes 15 cm. long, one of them hooked at apex; flowers 7 to 8 cm. long, yellow, in some forms said to be scarlet within; fruit oblong, 2 to

5 cm. long, fleshy, edible, dark brown to drab-colored; seeds pitted. "Biznaga de tuna" (Tamaulipas); "biznaga de limilla" (Nuevo León); "limilla," "biznaga costillona," "biznaga espinosa," "biznaga ganchuda" (Durango, *Patoni*).

Safford reports that in Nuevo León the fruit is used in cooking as a substitute for lemons.

28. **Ferocactus uncinatus** (Galeotti) Britt. & Rose, Cactaceae 3: 146. 1922.

Echinocactus uncinatus Galeotti; Pfeiff. Abbild. Beschr. Cact. 2: *pl. 18.* 1848.

Echinocactus ancylacanthus Monville; Labour. Monogr. Cact. 201. 1853.

Central and eastern Mexico. Western Texas.

Plant short-cylindric, 10 to 20 cm. high, bluish, slightly glaucous, with spindle-shaped roots; ribs usually 13, straight, strongly tubercled, undulate; flowering areoles narrow, extending from the spine clusters to the base of the tubercles with the flower at the opposite end, felted; areoles also bearing one or more large flat yellow glands, these surrounded by a ring of short yellow hairs; central spine usually solitary, 12 cm. long or less, erect, yellow below, reddish above, hooked at tip; 3 lower radial spines spreading or reflexed, hooked; upper radials straight; flowers brownish, 2 to 2.5 cm. long, widely spreading; perianth segments numerous, linear-oblong; scales on ovary and flower tube triangular, scarious-margined, in age broadly auriculate at base; fruit oblong, 2 cm. long, at first green, turning brown to crimson and finally scarlet, naked except the appressed scales, somewhat fleshy, edible; seeds black, oblong, 1 to 1.5 mm. long, with basal hilum.

29. **Ferocactus rostii** Britt. & Rose, Cactaceae 3: 146. 1922.

Northern Baja California. Southeastern California.

Sometimes growing in clumps of 8 to 10 heads but usually slender-cylindric, up to 3 meters high; ribs 16 to 22, rather low (hardly 1 cm. high), obtuse, somewhat tubercled; areoles large, white-felted, approximate; spine clusters closely set, the spines interlocking and almost hiding the body of the plant; radial bristles sometimes wanting but when present 2 to 8, white or yellowish; spines about 12, sometimes fewer, 3 or 4 central, those on the lower part of the plant more or less spreading, those at or near the top erect, somewhat flexible, flattened, annulate, pungent, either straight or curved at apex, perhaps never hooked, usually yellow but sometimes reddish on young plants but also turning yellow in age; flowers dark yellow; fruit red.

DOUBTFUL SPECIES.

The following are perhaps of this genus:

ECHINOCACTUS HAEMATACANTHUS Monville; Weber, Dict. Hort. Bois 466. 1896.

Reported from Puebla.

Simple, sometimes perhaps proliferous, short-cylindric, 50 cm. high, 30 cm. in diameter; ribs 12 to 20, stout, light green; spines all straight, reddish with yellowish tips, the radials 6, the centrals 4, 3 to 6 cm. long; flowers funnelform, 6 cm. long, purple; scales of ovary round, white-margined; fruit ovoid, 3 cm. long.

ECHINOCACTUS RAFAELENSIS Purpus, Monatsschr. Kakteenk. 22: 163. 1912.

Type from Minas de San Rafael, San Luis Potosí.

In clusters of 8 to 10, globose to short-cylindric, light green, at the apex slightly depressed and woolly; ribs 13 to 20, prominent; areoles elliptic; radial spines 7 to 9, 3 cm. long, the upper ones somewhat connivent; central spine solitary, 4 to 6 cm. long.

34. ECHINOMASTUS Britt. & Rose, Cactaceae 3: 147. 1922.

Plants small, globular or short-cylindric, ribbed, the ribs low, more or less spiraled, divided into definite tubercles; areoles bearing several acicular spines with or without stouter central ones; flowers central, medium-sized, borne at the spine areoles, usually purple; fruit small, short-oblong, scaly, becoming dry, dehiscing by a basal opening; scales few, their axils naked; seed large, muricate, black, with a depressed ventral hilum.

One other species occurs in Arizona.

Areoles elongate, with more or less pectinate spines.
  Central spines unlike, one or two of them different from the others.
    1. E. intertextus.
  Central spines nearly alike---------- **2. E. dasyacanthus.**
Areoles circular.
  Central spines subulate, some of them strongly curved-- **3. E. unguispinus.**
  Central spines acicular.
    Plants globular; ribs 20 to 25; radial spines white---- **4. E. macdowellii.**
    Plants ovoid; ribs 18 to 21; radial spines with black tips.
      5. E. durangensis.

1. Echinomastus intertextus (Engelm.) Britt. & Rose, Cactaceae 3: 149. 1922.
Echinocactus intertextus Engelm. Proc. Amer. Acad. 3: 277. 1856.
Cereus pectinatus centralis Coulter, Contr. U. S. Nat. Herb. 3: 386. 1896.
Echinocereus centralis Rose, Contr. U. S. Nat. Herb. 12: 293. 1909.
Northern Mexico. Texas to Arizona.

Simple, globular or nearly so, 2.5 to 10 cm. in diameter; ribs 13, somewhat acute, more or less divided into tubercles; areoles 5 to 6 mm. apart, somewhat elliptic; spines rigid, red with darker tips; radial spines 16 to 25, appressed, 8 to 15 mm. long, 3 or 4 of the upper radial spines white or nearly so, more slender than the others, almost bristle-like; central spines 4, subulate, 3 of them turned upward and similar to the radials, 10 to 18 mm. long, the other one very short, porrect; flowers 2.5 cm. long, nearly as broad as long, purplish; outer perianth segments about 20, broadly ovate, white-margined; inner perianth segments 20 to 25, oblong, mucronate; fruit nearly globular, 8 to 10 mm. in diameter, with a few scarious scales; seeds black, shining, 2 mm. in diameter.

2. Echinomastus dasyacanthus (Engelm.) Britt. & Rose, Cactaceae 3: 150. 1922.
Echinocactus intertextus dasyacanthus Engelm. Proc. Amer. Acad. 3: 277. 1856.
Southwestern Texas, the type from El Paso; doubtless occurring also in Chihuahua.

Plants cylindric, 10 to 15 cm. high; ribs somewhat spiraled, made up of numerous compressed tubercles; spines slender, more or less purplish; radials 19 to 25, 12 to 22 mm. long; centrals about 4, nearly equal; top of flowering plant and young areoles very woolly; scales and outer perianth segments red with white margins; inner perianth segments white or purplish, about 2.5 cm. long, acute or acuminate; ovary bearing a few ovate scales, these naked in their axils.

3. Echinomastus unguispinus (Engelm.) Britt. & Rose, Cactaceae 3: 150. 1922.
Echinocactus unguispinus Engelm. in Wisliz. Mem. North. Mex. 111. 1848.
Echinocactus trollietii Rebut, Balt. Cact. Journ. 2: 147. 1895.
Chihuahua and Zacatecas; type from Pelayo, Chihuahua.

Plants simple, usually globular, sometimes short-cylindric, 10 to 12 cm. high when mature, pale bluish green; ribs low; areoles woolly when young, circular; armament very peculiar, at times almost hiding the plant, most of the spines being erect or connivent; radial spines widely spreading, often as many as 25, usually white, except the tips, these darker, the upper ones 2 cm. long, a little longer than the lower; central spines 4 to 8, stouter than the radials, at first reddish or black, but becoming grayish blue in age, the lowest turned outward and downward and all more or less curved; flowers 2.5 cm. long, reddish.

4. **Echinomastus macdowellii** (Rebut) Britt. & Rose, Cactaceae 3: 151. 1922.
Echinocactus macdowellii Rebut; Quehl, Monatsschr. Kakteenk. 4: 133. 1894.
Northern Mexico.

Simple, globular or a little depressed, about 7 cm. high, 12 cm. in diameter, covered with a mass of interlocking spines; ribs 20 to 25, pale green, 5 to 7 mm. high, divided into tubercles; radial spines 15 to 20, white, spreading, up to 1.8 cm. long; central spines 3 or 4, dark colored, the longest up to 5 cm. in length; flowers rose-colored, up to 4 cm. long; ovary globose, said to be scaly.

5. **Echinomastus durangensis** (Rünge) Britt. & Rose, Cactaceae 3: 152. 1922.
Echinocactus durangensis Rünge, Hamb. Gartenz. 46: 231. 1890.
Zacatecas and Durango.

Simple, ovoid, about 8 cm. long, 7 cm. in diameter; ribs 18 to 21, low; areoles white-woolly when young, but without wool when old; radial spines 15 to 30, the lower shorter than the upper, more or less incurved, white except the black tips, 1.5 cm. long; central spines 3 or 4, a little longer than the radials, acicular, about 2 cm. long.

35. ECHINOCACTUS Link & Otto, Wochenschr. Ver. Beförd. Gartenb. 3: 420. 1827.

Plants very large, thick, cylindric and many-ribbed, or low and several-ribbed, the top clothed with a dense mass of wool or nearly naked; areoles very spiny, large, those on the upper part of old plants sometimes united; flowers from the crown of the plant, often partly hidden by the dense wool at the top, usually yellow, rarely pink, of medium size; outer perianth segments narrow, sometimes terminating in pungent tips; inner perianth segments oblong, thinner than the outer, obtuse; scales on flower tube numerous, imbricate, persistent, pungent; scales on ovary small, often linear, their axils filled with matted wool; fruit densely covered with white wool, thin-walled, oblong; seeds blackish, smooth, shining, or rarely papillose, with a small subbasal hilum.

One other species is known, a native of Utah and Arizona.

Plants very large, often becoming cylindric.
- Spines all bright yellow ..... **1. E. grusonii.**
- Spines brown to gray, rarely some of them yellowish.
  - Inner perianth segments linear-oblong, entire ..... **2. E. ingens.**
  - Inner perianth segments oblong, more or less toothed or lacerate.
    - Spines all of one kind ..... **3. E. visnaga.**
    - Spines both radial and central.
      - Central spine solitary.
        - Flowers 4 to 5 cm. long; central spine 4 to 5 cm. long, nearly black ..... **4. E. grandis.**
        - Flowers 3 cm. long; central spine 3 cm. long, grayish in age. **5. E. platyacanthus.**
      - Central spines several ..... **6. E. palmeri.**

Plants relatively small, subglobose.
Flowers yellow.....7. E. polycephalus.
Flowers pink.....8. E. horizonthalonius.

1. **Echinocactus grusonii** Hildemann, Monatsschr. Kakteenk. 1: 4. 1891.
San Luis Potosí and Hidalgo.

Plants single, depressed-globose, 20 to 130 cm. high or more, often 40 to 80 cm. in diameter, light green; ribs 21 to 37, rather thin and high; spines when young golden yellow, becoming pale and nearly white, in age dirty brown; radial spines 8 to 10, subulate, 3 cm. long; central spines usually 4, up to 5 cm. long; flowers 4 to 6 cm. long, 5 cm. broad at top, the segments never widely spreading; flower tube 3 cm. broad, covered with lanceolate long-acuminate scales; outer perianth segments long-acuminate, brownish on the outside, yellowish within; inner perianth segments cadmium-yellow, erect, narrowly lanceolate, acuminate; ovary spherical, bearing acuminate scales with an abundance of wool in their axils; fruit oblong to spherical, 12 to 20 mm. long, thin-walled, covered with white wool or becoming naked below; seeds smooth, dark chestnut-brown, shining, 1.5 mm. long.

Echinocactus corynacanthus Scheidw. and *E. galeottii* Scheidw. (Allg. Gartenz. 9: 50. 1841) may belong here.

2. **Echinocactus ingens** Zucc.; Pfeiff. Enum. Cact. 54. 1837.
Hidalgo and elsewhere in central Mexico.

Globular to short-oblong, 150 cm. high, 125 cm. in diameter (but reported by Karwinsky to be 5 to 6 feet in diameter), glaucescent, somewhat purplish, very woolly at the top; ribs numerous, tuberculate; areoles large, distant, 2.5 to 3 cm. apart, bearing copious yellow wool; spines brown, straight, rigid, 2 to 3 cm. long; radial spines 8; central spine 1; perianth 2 cm. long, 3 cm. broad; inner perianth segments linear-oblong, yellow, entire, obtuse; fruit ovoid, 3 cm. long, copiously covered by wool, coming from the axils of small scales; seeds large, black, shining, reniform.

3. **Echinocactus visnaga** Hook. in Curtis's Bot. Mag. 77: *pl. 4559.* 1851.
San Luis Potosí.

Very large, 2 to 3 meters high, 70 to 100 cm. in diameter, glaucous-green, the summit covered with a mass of tawny wool; ribs 15 to 40, somewhat undulate but hardly tubercled, acute; areoles large, approximate and sometimes almost touching one another; spines 4, stout, subulate, all radial, the upper one erect, 5 cm. long, the 3 lower spreading, pale brown; flowers yellow, 7 to 8 cm. broad when fully expanded; inner perianth segments numerous, oblong, spatulate, acute, serrate, 3.5 long; ovary elongate, 8 to 10 cm. long, crowned by the persistent perianth, densely lanate; scales on upper part of ovary, at least, narrow, subpungent.

4. **Echinocactus grandis** Rose, Contr. U. S. Nat. Herb. 10: 126. 1906.
Puebla, the type from Tehuacán.

Simple, cylindric, 1 to 2 meters high, 60 to 100 cm. in diameter, dull green and, when young, with broad horizontal bands, very woolly at the crown; ribs on young plants as few as 8, broad, high, and more or less undulate, but in old plants very numerous and rather thin; areoles remote on young plants, confluent in old flowering plants; spines stout, subulate, distinctly banded, especially the stouter ones, at first yellowish but soon reddish brown; radial spines usually 5 or 6, 3 to 4 cm. long, central spine solitary, 4 to 5 cm. long, straight; flowers numerous, yellow, 4 to 5 cm. long; scales on the ovary linear, their axils bearing an abundance of wool covering the ovary

with a dense felty mass; upper scales narrow, rigid, more or less spiny-tipped; outer perianth segments ovate, long-apiculate, with ciliate margins; inner segments oblong, obtuse, retuse or apiculate, serrulate; fruit hidden in a mass of soft white wool, oblong, 4 to 5 cm. long; seeds black, shining, 2.5 mm. long.

5. **Echinocactus platyacanthus** Link & Otto, Wochenschr. Ver. Beförd. Gartenb. 3: 423. 1827.

Eastern Mexico.

Stems nearly globular, 50 cm. high, 60 cm. broad, light green, very woolly at apex; ribs 21 to 30, acute; spines brownish at first, grayish in age; radial spines 4, spreading, 12 to 16 mm. long; central spines 3 or 4, spreading, 3 cm. long; flowers 3 cm. long, long-woolly; outer perianth segments lanceolate, mucronate; inner perianth segments obtuse, yellow.

6. **Echinocactus palmeri** Rose, Contr. U. S. Nat. Herb. 12: 299. 1909.

Coahuila to Zacatecas; type from Concepción del Río, Zacatecas.

Stems 1 to 2 meters high, 40 to 50 cm. in diameter; ribs 12 to 26, or perhaps more in large plants; central spines 4, annular, the upper one erect, 6 to 8 cm. long, stout, straight, yellow above, brownish and somewhat swollen at base, the 3 lower ones shorter, spreading, similar in color and markings but flattened; radial spines 5 to 8, much smaller, lighter colored and weaker; flowers yellow, rather small; perianth segments about 2 cm. long, more or less lacerate along the margin; fruit about 3 cm. long, hidden in a dense covering of soft white wool; scales weak and bristle-tipped. "Biznaga burra" (Zacatecas).

7. **Echinocactus polycephalus** Engelm. & Bigel. Proc. Amer. Acad. 3: 276. 1856.

Northern Sonora; reported from Baja California. Utah and Arizona to California; type from the Mojave River, California.

Solitary when young, in age forming large clumps of 20 to 30 heads, each globular to short-cylindric, sometimes as much as 70 cm. high but usually smaller; ribs 13 to 21, rather stout, 2 to 3 cm. high, somewhat undulate, nearly hidden under the dense spine armament; areoles 10 to 12 mm. in diameter, 1 to 3.5 cm. apart; spines 7 to 15, when young covered with a downy felt but afterwards glabrate, reddish, subulate, more or less flattened, the radials 2.5 to 5 cm. long; central spines 4, stouter than the radials, 3 to 9 cm. long, more or less annulate; flowers yellow, 5 to 6 cm. long; scales on ovary minute, hidden under the mass of long wool borne in their axils; scales on flower tube numerous, only a little longer than the wool, chartaceous, pungent; inner perianth segments linear-oblong, 2.5 to 3 cm. long, entire, obtuse; fruit densely woolly, crowned by the somewhat spinescent scales, globose to oblong, dry, 1.5 to 2.5 cm. long, dehiscing by a basal pore; seeds angled, papillose, dull black, 3 to 4 mm. long.

8. **Echinocactus horizonthalonius** Lem. Cact. Hort. Monv. 19. 1839.

Echinocactus equitans Scheidw. Bull. Acad. Brux. 6[1]: 88. 1839.

Echinocactus laticostatus Engelm. & Bigel. U. S. Rep. Expl. Miss. Pacif. 4: 32. 1856.

Northern Mexico. Western Texas to Arizona.

Simple, globular or sometimes depressed or short-cylindric, 4 to 25 cm. high, glaucous; ribs 7 to 13, obtuse, often spirally arranged; spines 6 to 9, somewhat curved or straight, 2 to 4 cm. long, often very stout, more or less flattened, often annulate, reddish or sometimes blackish at base; central spine solitary, stouter than the radials; flowers pale rose to pink, 5 to 7 cm. long before expanding, broader than long when fully open; outer perianth seg-

ments linear with more or less pungent tips; inner perianth segments narrowly oblong, about 3 cm. long; ovary and fruit bearing linear scales, their axils very woolly; fruit dehiscing by a basal pore, oblong, red, 3 cm. long, clothed with long white wool; seeds 2 mm. long, more or less angled, brownish black, papillose. "Manca mula," "biznaga meloncillo," "biznaga de dulce" (Durango, *Patoni*); "manca caballo" (Zacatecas); "biznaga" (Texas).

The flesh of the young plants is said to be employed for making a sweetmeat, like that prepared from *Ferocactus*.

36. **HOMALOCEPHALA** Britt. & Rose, Cactaceae 3: 181. 1922.

A single species is known.

1. **Homalocephala texensis** (Hopffer) Britt. & Rose, Cactaceae 3: 181. 1922.
   Echinocactus texensis Hopffer, Allg. Gartenz. 10: 297. 1842.
   Echinocactus platycephalus Mühlenpf. Allg. Gartenz. 16: 9. 1848.
   Northern Mexico. Texas and New Mexico; type from Texas.

Usually simple, sometimes globose, but generally much depressed, in large plants 30 cm. broad, 10 to 15 cm. high; ribs 13 to 27, very prominent, acute; areoles only 2 to 6 to a rib, densely white-felted when young, large; radial spines usually 6, rarely 7, spreading or recurved, more or less flattened, unequal, 1.2 to 4 cm. long, rarely 5 cm. long, reddish, more or less annulate; central spine solitary, longer than the radials, 3 to 6.5 cm. long, 3 to 8 mm. broad, much flattened, strongly annulate; flowers broadly campanulate, 5 to 6 cm. long and fully as broad, scarlet and orange below, pink to nearly white above; outer perianth segments linear with more or less lacerate margins and terminated by long spinose tips; inner perianth segments with less pungent tip or without any, but with strongly lacerate margins; stigma lobes 10, linear, pale pink; scales on ovary and flower tube linear, pungent; fruit scarlet, globular, 16 to 40 mm. in diameter, nearly smooth when mature, at first pulpy but becoming dry and apparently splitting open unequally; seeds large, uniform, black, smooth, shining, somewhat flattened, angled on the back, 3 mm. broad. "Manca caballo" (Nuevo León).

37. **ASTROPHYTUM** Lem. Cact. Hort. Monv. 3. 1839.

Plants globular or more or less flattened to short-cylindric; ribs few, very prominent, more or less covered with white radiating hairy scales; spines usually wanting, weak or subulate in two species; flowers borne at the top of the plant, large, yellowish with a reddish center, soon fading, persistent, campanulate to short-funnelform; fruit globular, covered with brown scarious imbricate scales, these woolly in their axils, and more or less pungent; seeds dark brown, smooth and shining, with a large depressed hilum having inturned margins.

The following are the only species known.

Spines none.
- Plants globular to columnar; flowers 4 to 6 cm. long ---- **1. A. myriostigma.**
- Plants much depressed; flowers 3 cm. long ---- **2. A. asterias.**

Spines present.
- Spines flat, ribbon-like, hardly pungent ---- **3. A. capricorne.**
- Spines subulate ---- **4. A. ornatum.**

1. **Astrophytum myriostigma** Lem. Cact. Hort. Monv. 4. 1839.
   Cereus callicoche Galeotti; Scheidw. Bull. Acad. Brux. 6[1]: 88. 1839.
   Echinocactus myriostigma Salm-Dyck, Cact. Hort. Dyck. 1844. 22. 1845.
   Northern Central Mexico; occurring in Coahuila and San Luis Potosí and elsewhere.

Plants solitary or cespitose, globular to cylindric, up to 60 cm. high; ribs usually 5, sometimes 6, 8, or rarely even 10, very broad, acute, usually covered with white woolly scales but sometimes naked; spines wanting, at least on old plants; flowers 4 to 6 cm. long; outer perianth segments narrow, with brown scarious tips; inner perianth segments oblong; scales on ovary and flower tube scarious, imbricate, narrow, often bristly-tipped, with long wool in their axils. "Mitra" (San Luis Potosí); "birreta de obispo" (Coahuila); "bonete", "peyote cimarrón" (Durango).

2. **Astrophytum asterias** (Zucc.) Lem. Cact. 50. 1868.
Echinocactus asterias Zucc. Abh. Akad. Wiss. München 4²: 13. 1845.
Tamaulipas and Nuevo León, and elsewhere in northern Mexico.
Plant much depressed, only 2 to 3 cm. high, about 8 cm. broad; ribs 8, very low, almost flat on top, the surface bearing numerous depressions, containing tufts of wool; areoles prominent, circular, felted, 4 to 5 mm. apart, spineless; flowers 3 cm. long, yellow. "Peyote."

3. **Astrophytum capricorne** (Dietr.) Britt. & Rose, Cactaceae **3**: 184. 1922.
Echinocactus capricornis Dietr. Allg. Gartenz. **19**: 274. 1851.
Northern Mexico; type from La Rinconada.
Subglobose or short-cylindric, up to 25 cm. high; ribs 7 or 8, high, acute; areoles 2 to 3 cm. apart; spines several, more or less flattened, weak, hardly pungent, brown, 3 to 5 cm. long; flowers 6 to 7 cm. long; outer perianth segments reddish, gradually passing into the lemon-yellow inner ones, spatulate, acute or cuspidate, entire or more or less toothed; seeds 2.5 mm. broad, shining. "Biznaga de estropajo" (Durango, *Patoni*).

4. **Astrophytum ornatum** (DC.) Weber; Britt. & Rose, Cactaceae **3**: 185. 1922.
Echinocactus ornatus DC. Mém. Mus. Hist. Nat. **17**: 114. 1828.
Echinocactus mirbelii Lem. Cact. Aliq. Nov. 22. 1838.
Echinocactus holopterus Miquel, Linnaea **12**: 2. 1838.
Echinocactus tortus Scheidw. Bull. Acad. Brux. **5**: 493. 1838.
Echinocactus ghiesbrechtii Salm-Dyck, Allg. Gartenz. **18**: 395. 1850.
Echinopsis haageana Linke, Wochenschr. Gärtn. Pflantz. **1**: 86. 1858.
Hidalgo and Querétaro.
Subglobose to cylindric, 3 cm. high or more, the surface more or less white-floccose; ribs 8, rather prominent, 2 cm. high or more, acute; areoles 1 to 5 cm. apart, felted; spines 5 to 11, subulate, yellow at first, becoming brown, often 3 cm. long; flowers lemon-yellow, 7 to 9 cm. broad; inner perianth segments broadly oblong, with a broad, more or less serrate apex; scales on ovary very narrow.

38. CACTUS L. Sp. Pl. 466. 1753.

About 18 species are known, natives of tropical America.

1. **Cactus salvador** (Murillo) Britt. & Rose, Cactaceae **3**: 228. 1922.
Melocactus salvador Murillo, Circular (about 1897).
Vicinity of Jalapa, Veracruz.
Plants simple, globose, 30 to 40 cm. in diameter; ribs 13; radial spines 1 to 3, longer and stouter than the radials, those near the center of the plant nearly erect, those on the side somewhat curved downward; cephalium 8 cm. in diameter; flowers rose-pink; seeds black.
Two other species of *Melocactus* have been described from Mexico, *M. curvispinus* Pfeiff. (Enum. Cact. 46. 1837) and *M. delessertianus* Lem. (Hort. Univ. **1**: 225. 1839), but both are imperfectly known.

39. ANCISTROCACTUS Britt. & Rose, Cactaceae 4: 3. 1923.

Small, globular or short-cylindric plants, indistinctly ribbed, strongly tubercled, very spiny, one of the central spines always hooked; flowering tubercles more or less grooved on the upper side; flowers rather small, short, funnelform, borne at the top of the plant; ovary small, bearing a few thin scales, these always naked in their axils; fruit oblong, greenish, juicy, thin-celled, usually naked below but with a few broad cordate thin-margined scales above; seeds globular, rather large, brownish to black.

One other species occurs in Texas.

Radial spines 20 or more, strongly appressed, pectinate; flowering areoles naked ---------- 1. **A. megarhizus.**

Radial spines 19 or fewer, more or less spreading, hardly pectinate; flowering areoles woolly ---------- 2. **A. scheeri.**

1. **Ancistrocactus megarhizus** (Rose) Britt. & Rose, Cactaceae 4: 4. 1923.
Echinocactus megarhizus Rose, Contr. U. S. Nat. Herb. 12: 290. 1909.
Type from Victoria, Tamaulipas.

Solitary or in clusters of 3 or 4; plant body nearly globular or a little elongate, 5 to 8 cm. high, usually solitary, from large fleshy roots; ribs spiral, divided into dark green tubercles, 4 to 5 cm. high; radial spines 20 or more, pectinate, at first pale yellow, in age white; in seedlings the spines pubescent; central spines usually 4, the 3 upper similar to the radials, although a little stouter, the lower central spines stout and strongly hooked, 15 mm. long; fruit green, suggesting that of a *Coryphantha*, clavate, bearing a few naked scales near the top; seeds black, smooth, shining.

2. **Ancistrocactus scheeri** (Salm-Dyck) Britt. & Rose, Cactaceae 4: 4. 1923.
Echinocactus scheeri Salm-Dyck, Cact. Hort. Dyck. 1849. 155. 1850.
Northern Mexico. Texas.

Globular to clavate, 3.5 to 5 cm. long; ribs usually 13, indistinct, somewhat spiraled, strongly divided into stout terete tubercles grooved only to the middle; radial spines 15 to 18, spreading, 12 mm. long or less, white to straw-colored; central spines 3 or 4, the lowest strongly hooked; flowers 2.5 cm. long, greenish yellow; ovary small, nearly naked; seeds large (about 2 mm. long), brown and minutely tuberculate (according to Coulter).

40. THELOCACTUS Britt. & Rose, Bull. Torrey Club 49: 251. 1922.

Plants of medium size, globular or somewhat depressed, spiny, often densely so; ribs few, low or even indistinct, often spiraled, divided into large tubercles; flowering tubercles more or less grooved above; flowers from near the center of the plant, borne on very young tubercles, rather large, campanulate, diurnal; scales on ovary usually few, their axils naked; fruit, so far as known, dry, dehiscing by a basal pore; seeds numerous, black, finely tuberculate, with a large basal hilum.

The species here listed are the only ones known.

Ribs indefinite, strongly tubercled.
- Spines partly curved outward ---------- 5. **T. buekii.**
- Spines all straight.
  - Tubercles not flattened laterally; radial spines 6 to 9. 1. **T. hexaedrophorus.**
  - Tubercles flattened laterally; radial spines 1 to 5.
    - Flowers white ---------- 2. **T. rinconensis.**
    - Flowers not white.
      - Flowers salmon to yellow ---------- 3. **T. lophothele.**
      - Flowers rose-purple ---------- 4. **T. phymatothele.**

Ribs definite, but more or less divided into tubercles.
Flowers yellowish.
Ribs 8 to 13----6. T. leucacanthus.
Ribs 20 to 25----7. T. nidulans.
Flowers red to purple.
Spines all straight.
Spines subulate----8. T. fossulatus.
Spines acicular----9. T. tulensis.
Spines more or less curved.
Spines 8 or fewer----10. T. lloydii.
Spines numerous.
Central spines flexible, usually straight, porrect or ascending. 11. T. bicolor.
Central spines subulate, rigid, some of them curved and reflexed. 12. T. pottsii.

1. **Thelocactus hexaedrophorus** (Lemaire) Britt. & Rose, Bull. Torrey Club 49: 251. 1922.
Echinocactus hexaedrophorus Lem. Cact. Hort. Monv. 27. 1839.
Central Mexico; type from Tampico, Tamaulipas.
Globose or somewhat flattened above or umbilicate, glaucous, strongly tubercled, not ribbed, 13 to 14 cm. in diameter; tubercles prominent, somewhat 6-sided, 27 mm. broad at base, arranged in indefinite spirals; radial spines 6 to 9, spreading, unequal, 11 to 18 mm. long, rigid, straight, subulate, annulate; central spine much stouter than the radials, erect, 2.3 to 3 cm. long; flowers 5.5 cm. long and broader than long when expanded; perianth segments oblong, purplish.

2. **Thelocactus rinconensis** (Poselger) Britt. & Rose, Cactaceae 4: 7. 1923.
Echinocactus rinconensis Poselger, Allg. Gartenz. 23: 18. 1855.
Nuevo León; type from Rinconada.
Simple, globose or somewhat depressed, 6 to 8 cm. high, 12 cm. in diameter; ribs somewhat spiraled, strongly tubercled; tubercles more or less flattened laterally, somewhat angled; spines usually only 3, acicular, 1.5 cm. long; flowers white, 4 cm. long; inner perianth segments lanceolate, acute.

3. **Thelocactus lophothele** (Salm-Dyck) Britt. & Rose, Bull. Torrey Club 49: 251. 1922.
Echinocactus lophothele Salm-Dyck, Allg. Gartenz. 18: 395. 1850.
Chihuahua; type from Chihuahua City.
Simple or in its native state cespitose, globose, sometimes depressed or short-cylindric, up to 25 cm. high, glaucous; ribs indefinite, strongly tuberculate, the tubercles flattened; areoles depressed, grayish-lanate when young; radial spines 3 to 5, stout, purplish brown, 1 to 3 cm. long; central spines wanting or solitary; flowers salmon to rose, about 5 cm. broad; perianth segments nearly linear, acute; scales of ovary glabrous, 6 mm. long.

4. **Thelocactus phymatothele** (Poselger) Britt. & Rose, Cactaceae 4: 8. 1923.
Echinocactus phymatothelos Poselger; Först. Handb. Cact. ed. 2. 602. 1885.
Mexico, the range not known.
Simple, depressed-globose, 5 cm. high, 9 to 10 cm. in diameter; ribs glaucous-green, 13, divided into low irregular tubercles, these somewhat flattened and pointed; spines usually 1 to 3, sometimes wanting, subulate, rigid, 2 cm. long, brown, spreading; flowers 6 cm. broad; inner perianth segments pinkish, narrow, acute; scales present on ovary and flower tube.

5. Thelocactus buekii (Klein) Britt. & Rose, Cactaceae 4: 8. 1923.
Echinocactus buekii Klein, Gartenflora 8: 257. 1859.
Mexico, the locality not known.
Stems simple, deep green; tubercles distinct, somewhat pointed, angled; spines about 7, reddish, unequal, some of them outwardly curved, the longer ones much elongate; flowers dark red; inner perianth segments narrow.

6. Thelocactus leucacanthus (Zucc.) Britt. & Rose, Cactaceae 4: 8. 1923.
Echinocactus leucacanthus Zucc.; Pfeiff. Enum. Cact. 66. 1837.
Cereus tuberosus Pfeiff. Enum. Cact. 102. 1837.
Cereus maelenii Pfeiff. Allg. Gartenz. 5: 378. 1837.
Echinocactus porrectus Lem. Cact. Aliq. Nov. 25. 1838.
Echinocactus subporrectus Lem. Cact. Aliq. Nov. 25. 1838.
Echinocactus theloideus Salm-Dyck, Allg. Gartenz. 18: 396. 1850.
Central Mexico; type from Zimapán, Hidalgo.
Densely cespitose, short-cylindric, 10 to 15 cm. long; ribs 8 to 13, sometimes spiraled, obtuse, tubercled; radial spines 7 to 20, at first light yellow, in age gray, spreading or recurved, unequal, the longer ones 4 cm. long, more or less annulate; central spines solitary, at first blackish, in age gray, up to 5 cm. long; flowers yellow, 5 cm. long; inner perianth segments numerous, lanceolate, acute; ovary and flower tube bearing broad imbricate scales.
Here should perhaps be referred *Echinocactus ehrenbergii* Pfeiffer (Allg. Gartenz. 6: 275. 1838).

7. Thelocactus nidulans (Quehl) Britt. & Rose, Cactaceae 4: 9. 1923.
Echinocactus nidulans Quehl, Monatsschr. Kakteenk. 21: 119. 1911.
Mexico, the range not known.
Simple, depressed-globose, 10 cm. high, sometimes 20 cm. in diameter, gray, usually glaucous; ribs 20 to 25, rather indistinct, divided into tubercles; spines about 15, all similar, 2 to 6 cm. long; flowers 4 cm. long, yellowish white.

8. Thelocactus fossulatus (Scheidw.) Britt. & Rose, Cactaceae 4: 10. 1923.
Echinocactus fossulatus Scheidw. Allg. Gartenz. 9: 49. 1841.
San Luis Potosí.
Globose to much depressed, 10 to 15 cm. in diameter; ribs usually 13, slightly glaucous, bronzed; tubercles large, somewhat flabby, more or less compressed, dorsally somewhat angled; flowering areoles narrow, sometimes extending forward to the next tubercle; radial spines 4 or 5, unequal, 1 to 3.5 cm. long, brown; central spine solitary, 3 to 4.5 cm. long, subulate, annulate; flowers central, nearly white or slightly tinged with pink; scales on flower tube ovate, their scarious margins slightly ciliate.
Echinocactus drageanus Moerder (Rev. Hort. 67: 186. 1895) and *E. droegeanus* Hildmann (Schum. Gesamtb. Kakt. 438. 1898) probably belong here.

9. Thelocactus tulensis (Poselger) Britt. & Rose, Cactaceae 4: 11. 1923.
Echinocactus tulensis Poselger, Allg. Gartenz. 21: 125. 1853.
Tamaulipas; type from Tula.
Plant simple to abundantly cespitose, globular to short-cylindric, up to 26 cm. high; ribs 8 to 13, strongly tubercled; radial spines 6 to 8, more or less spreading, 10 to 15 mm. long, brownish; central spines solitary or sometimes 2, 3 cm. long; flowers 2.5 cm. long, rose-colored; inner perianth segments linear-oblong, acute.

10. **Thelocactus lloydii** Britt. & Rose, Cactaceae 4: 11. 1923.

Zacatecas.

Plants simple, depressed-globose, 8 to 12 cm. broad, pale bluish green, strongly tubercled and strongly armed; tubercles conspicuous but low, often wider than long, sometimes 4 cm. wide; flowering groove rather conspicuous but narrow, extending from the spines halfway to the axil of the tubercle; spines usually 8, sometimes with a smaller accessory one, all ascending from the base and curved outward from the center, terete or somewhat angled at base, often highly colored below, with sharp yellowish crimson tips, the longer ones 6 cm. long; outer perianth segments very pale purple.

11. **Thelocactus bicolor** (Galeotti) Britt. & Rose, Bull. Torrey Club 49: 251. 1922.

Echinocactus bicolor Galeotti; Pfeiff. Abbild. Beschr. Cact. 2: *pl. 25.* 1848.
Echinocactus rhodophthalmus Hook. in Curtis's Bot. Mag. 76: *pl. 4486.* 1850.
Echinocactus ellipticus Lem. Jard. Fleur. 3: *pl. 270.* 1853.
Echinocactus bolansis Rünge, Gartenflora 38: 106. 1889.

Central and eastern Mexico. Texas.

Plants simple, globose to conic, glaucous, small, up to 3 cm. high, very spiny; ribs usually 8, broad, somewhat tubercled; areoles approximate; spines highly colored, sometimes bright red or yellowish or red and yellow; radial spines 9 to 18, widely spreading or sometimes bent backward at tip, 3 cm. long or less; central spines usually 4, ascending or porrect, all straight, 3 to 5 cm. long, subulate; flowers 5 to 6 cm. long and fully as broad when expanded; outer perianth segments pale purple, the inner ones deep purplish pink, oblong, acute; scales on ovary and flower tube imbricate, ovate, with scarious and ciliate margins; fruit about 1 cm. long, dehiscing by a large irregular basal opening; seeds 2 mm. long, black.

12. **Thelocactus pottsii** (Salm-Dyck) Britt. & Rose, Cactaceae 4: 12. 1923.

Echinocactus pottsii Salm-Dyck, Allg. Gartenz. 18: 395. 1850.
Echinocactus heterochromus Weber, Dict. Hort. Bois 466. 1896.

Chihuahua and Coahuila; type from Chihuahua City.

Globular or somewhat depressed, 10 to 15 cm. in diameter, somewhat glaucous, yellowish; ribs 8 or 9, broad and obtuse, more or less distinctly tubercled; areoles large, closely set on old plants, densely felted when young, naked in age; spines variable as to number, shape, size, and color; radial spines 7 to 10, acicular, usually terete, straight or incurved, more or less banded with red and white or pale yellow, 1 to 3 cm. long; central spines several, stout-subulate, more or less flattened, 3 to 4 cm. long, often white, sometimes banded with red; flowers 5 to 6 cm. long; scales on ovary and flower tube ovate. greenish, the margins thin and ciliate; inner perianth segments light purple, darker at base, oblong; fruit globose, 1.5 cm. in diameter; seeds tuberculate, black.

41. NEOLLOYDIA Britt. & Rose, Bull. Torrey Club 49: 251. 1922.

Small, more or less cespitose cacti, fibrous-rooted, cylindric, densely spiny, tubercled; tubercles more or less arranged on spiraled ribs, grooved above; radial spines numerous, widely spreading; central spines one to several, much stouter and longer than the radials; flowers large, pink or purple, subcentral from the axils of nascent tubercles, their segments widely spreading; fruit

compressed-globose, dull-colored, thin-walled, becoming papery, dry, with few scales or none; seeds globose, black, dull, tuberculate-roughened, with a large white basal scar.

One other species occurs in Texas.

Plants small, 3 cm. or less in diameter; central spines sometimes wanting. **1. N. pilispina.**

Plants larger; central spines always present.

Central spines curved or hooked---------- **2. N. clavata.**

Central spines all straight.

Central spine solitary.

Central spine stiff, porrect---------- **3. N. horripila.**

Central spine weak, ascending or connivent---------- **4. N. beguinii.**

Central spines several.

Spines white, or sometimes dark above---------- **5. N. ceratites.**

Spines, at least the central ones or part of them, black--- **6. N. conoidea.**

1. Neolloydia pilispina (Purpus) Britt. & Rose, Cactaceae 4: 14. 1923.

Mammillaria pilispina Purpus, Monatsschr. Kakteenk. 22: 150. 1912.

San Luis Potosí; type from Minas de San Rafael.

Plants cespitose, about 3 cm. in diameter; ribs indistinct, of very definite, somewhat angled tubercles; young spine areoles clothed with abundant long white wool covering the top of the plant; radial spines 6 or 7, 5 to 6 mm. long, weak and spreading the upper ones longer and connivent over the top of the plant, 2 cm. long or more, white with blackish tips; central spines often wanting, sometimes one; flowers 1.5 to 2 cm. long, purplish; outer perianth segments brownish.

2. Neolloydia clavata (Scheidw.) Britt. & Rose, Cactaceae 4: 15. 1923.

Mammillaria clavata Scheidw. Bull. Acad. Brux. 5: 494. 1838.

Mammillaria stipitata Scheidw. Bull. Acad. Brux. 5: 495. 1838.

Mammillaria rhaphidacantha Lem. Cact. Hort. Monv. 34. 1839.

Mammillaria ancistracantha Lem. Cact. Hort. Monv. 36. 1839.

?*Mammillaria potosiana* Jacobi, Allg. Gartenz. 24: 92. 1856.

Mammillaria sulcoglandulifera Jacobi, Allg. Gartenz. 24: 92. 1856.

?*Cactus brunneus* Coulter, Contr. U. S. Nat. Herb. 3: 117. 1894.

?*Cactus maculatus* Coulter, Contr. U. S. Nat. Herb. 3: 117. 1894.

Mammillaria radicantissima Quehl, Monatsschr. Kakteenk. 22: 164. 1912.

San Luis Potosí.

Plants simple, elongate, cylindric, 10 to 15 cm. high, dark bluish green; tubercles in rows of 5, 8, and 13, conic, grooved above, the axils when young bearing short white wool; glands in the groove 1 to several, large, red; radial spines 6 to 12, with reddish or black tips; central spine 1, somewhat longer than the radials, curved or even hooked; flowers small for the genus, about 2 cm. long; outer perianth segments linear, acute, entire, with broad brownish midrib, the inner ones linear, entire, narrow, creamy white.

3. Neolloydia horripila (Lem.) Britt. & Rose, Cactaceae 4: 16. 1923.

Mammillaria horripila Lem. Cact. Aliq. Nov. 7. 1838.

Hidalgo.

Simple or somewhat cespitose, globular to short-cylindric, 10 to 12 cm. high; tubercles glaucous, prominent, rounded at apex; radial spines 8 to 10, acicular, spreading, 15 mm. long, grayish; central spines solitary, straight, a little longer than the radials; flowers deep purple, 3 cm. long; inner perianth segments narrowly oblong, acute.

4. **Neolloydia beguinii** (Weber) Britt. & Rose, Bull. Torrey Club 49: 252. 1922.

Echinocactus beguinii Weber; Schum. Gesamtb. Kakt. 442. 1898.

Zacatecas and Coahuila; type probably from Saltillo, Coahuila.

Plant body cylindric, 10 to 15 cm. high; ribs spiraled and divided at regular intervals into low tubercles resembling geometric figures, pale bluish green but nearly hidden by the dense covering of spines; radial spines 20 or more, white but with dark tips; centrals usually single, longer and ascending; flowers appearing from the top of the plant, 3 to 4 cm. long, bright pink; ovary without scales; seeds black, tubercled.

5. **Neolloydia ceratites** (Quehl) Britt. & Rose, Cactaceae 4: 16. 1923.

Mammillaria ceratites Quehl, Monatsschr. Kakteenk. 19: 155. 1909.

Mexico.

Simple or in small clusters, short-cylindric, 6 to 10 cm. high; tubercles somewhat 4-angled, more or less arranged in ribs; young areoles very woolly but becoming naked; radial spines 15 to 20, more or less spreading, white, 1.5 cm. long; central spines 5 or 6, longer and stouter than the radials, blackish above; flowers purple, 3 to 3.5 cm. long; perianth segments oblong, acute.

6. **Neolloydia conoidea** (DC.) Britt. & Rose, Bull. Torrey Club 49: 252. 1922.

Mammillaria conoidea DC. Mém. Mus. Hist. Nat. 17: 112. 1828.

Mammillaria grandiflora Otto; Pfeiff. Enum. Cact. 33. 1837.

Mammillaria diaphanacantha Lem. Cact. Aliq. Nov. 39. 1838.

Mammillaria inconspicua Scheidw. Bull. Acad. Brux. 5: 495. 1838.

Mammillaria echinocactoides Pfeiff. Allg. Gartenz. 8: 281. 1840.

Mammillaria scheeri Mühlenpf. Allg. Gartenz. 13: 346. 1845.

Mammillaria strobiliformis Engelm. in Wisliz. Mem. North. Mex. 113. 1848.

Zacatecas and elsewhere in northern Mexico.

Sometimes simple but usually cespitose, sometimes forming large clusters, often branching or budding above, short-cylindric; tubercles in 5 or 8 spiral rows, obtuse, their axils very woolly; spines very numerous, often completely covering the plant; radial spines white, 25 or more, widely spreading, 8 to 10 mm. long; central spines several, stouter and longer than the radials, 1 to 3 cm. long, blackish; flowers large; outer perianth segments dull purple without, lighter toward the margins, the inner ones rich purple; fruit compressed, globose, dull yellow, mottled with red, becoming dry and papery, then brown; seeds 1 mm. in diameter.

42. MAMILLOPSIS Weber; Britt. & Rose, Cactaceae 4: 19. 1923.

Cespitose cacti, often forming large clusters, globular or short-cylindric, completely hidden under a mass of long soft white hairlike spines; tubercles not arranged in ribs, more or less conic, not grooved above, spine-bearing at the apex, their axils pubescent and bristly; radial spines numerous, weak, straight; central spines 4 to 6, with yellow hooked tips; flowers from near the top of the plant but apparently from the axils of old areoles, with a regular straight slender scaly tube and a broad spreading limb; perianth segments oblong, obtuse; stamens and style erect, long-exserted beyond the tube; scales on flower tube orbicular, obtuse.

Only the following species are known.

Flowers 6 to 7 cm. long, orange-yellow ..... 1. M. senilis.
Flowers 3 cm. long, deep red ..... 2. M. diguetii.

1. **Mamillopsis senilis** (Lodd.) Weber; Britt. & Rose, Cactaceae **4**: 19. 1923.
Mammillaria senilis Lodd.; Salm-Dyck, Cact. Hort. Dyck. 1849. 82. 1850.
High mountains of Chihuahua and Durango.

Stems 6 to 15 cm. high, 3 to 6 cm. in diameter, the flesh juicy and drying red; tubercles 3 to 4 mm. long; spines 30 to 40, 2 cm. long; flowers 6 cm. broad; perianth segments oblong, acute, with serrate margin. "Cabeza de vieja" (*Ochoterena*).

2. **Mamillopsis diguetii** (Weber) Britt. & Rose, Cactaceae **4**: 20. 1923.
Mammillaria senilis diguetii Weber, Bull. Mus. Hist. Nat. **10**: 383. 1904.
Jalisco and Sinaloa; type from Sierra de Nayarit, Jalisco.

Plants densely cespitose, forming a hemispheric clump of some 35 globular heads, each 25 cm. in diameter; radial spines numerous, dark straw-colored; flowers about 2 cm. broad; ovary bearing small scales.

43. COCHEMIEA Walton, Cact. Journ. **2**: 50. 1899.

Plant body cylindric, often much elongate, the surface covered with spirally arranged tubercles, these not milky; tubercles not grooved above; spines both central and radial; flowers borne from the axils of upper old tubercles, narrowly tubular, curved and bilabiate; perianth segments in 2 series; stamens and style red, exserted; ovary naked; fruit indehiscent, globular, red, naked, bearing a large scar at the top; seeds black, reticulate.

The species here listed are the only ones known.

Spines all straight----------**1. C. halei.**
Spines with some or all of the centrals hooked.
Central spine normally solitary----------**2. C. poselgeri.**
Central spines normally 2 to 11 (sometimes only one in No. 3).
Central spines 1 to 4----------**3. C. setispina.**
Central spines 8 to 11---------- ----------**4. C. pondii.**

1. **Cochemiea halei** (T. S. Brandeg.) Walton, Cact. Journ. **2**: 50. 1899.
Mammillaria halei T. S. Brandeg. Proc. Calif. Acad. II. **2**: 161. 1889.
Islands of southern Baja California; type from Magdalena Island.

Cespitose; stems nearly upright, often 30 to 50 cm. high, 5 to 7.5 cm. in diameter, almost entirely covered by the spines; tubercles short, their axils woolly but not setose; radial spines 10 to 20, 10 to 12 mm. long; central spines 3 or 4, 25 mm. long, all straight; flowers central or nearly so, 4 to 5 cm. long; fruit scarlet, 12 mm. long; seeds reticulate.

2. **Cochemiea poselgeri** (Hildmann) Britt. & Rose, Cactaceae **4**: 22. 1923.
Mammillaria poselgeri Hildmann, Gartenflora **34**: 559. 1885.
Mammillaria roseana T. S. Brandeg. Zoe **2**: 19. 1891.
Mammillaria radliana Quehl, Monatsschr. Kakteenk. **2**: 104. 1892.
Lower elevations in southern Baja California; type from the Cape Region.

Stems numerous from a central root, spreading or sometimes pendent from rocks or creeping over the ground, often 2 meters long, 4 cm. thick; areoles and upper axils white-woolly, the latter rarely setose; tubercles remote, somewhat flattened; radial spines 7 to 9, 9 to 12 mm. long, straw-colored; central spine 1, hooked, 25 mm. long; flowers appearing in the upper axils, 3 cm. long, scarlet; fruit globular, 6 to 8 mm. in diameter.

3. **Cochemiea setispina** (Coulter) Walton, Cact. Journ. **2**: 51. 1899.
Cactus setispinus Coulter, Contr. U. S. Nat. Herb. **3**: 106. 1894.
Mammillaria setispina Engelm.; K. Brandeg. Erythea **5**: 117. 1897.
Interior of southern Baja California, the type from San Borgia.

Stems ascending, 30 cm. high; tubercles short, their axils woolly but not setose; radial spines 10 to 12, white with black tips, widely spreading, unequal, 10 to 34 mm. long, slender; central spines 1 to 4, stouter than the radials, one of them strongly hooked; fruit obovoid, 3 cm. long, scarlet; seeds black and pitted.

4. **Cochemiea pondii** (Greene) Walton, Cact. Journ. 2: 51. 1899.
Mammillaria pondii Greene, Pittonia 1: 268. 1889.

Islands off the west coast of northern Baja California; type from Cedros Island.

Stems at first upright, cylindric, simple or few-branched, 7 to 30 cm. high, hidden under a dense covering of spines; axils of tubercles setose; young areoles white-tomentose; radial spines white or whitish or sometimes brownish, 15 to 25, spreading; central spines 8 to 11, much longer and stouter than the radials, the longest 3 cm. long, 1 or 2 hooked; flowers slender, 5 cm. long, bright scarlet; fruit purplish red, 18 mm. long, ovoid to obovoid.

44. CORYPHANTHA Lem. Cact. 32. 1868.

Plant body globular to cylindric, either simple or cespitose; tubercles, except the very earliest ones, grooved on the upper surface from apex to base; flowers from near the top of the plant and from the base of young and growing tubercles, large and showy, generally yellow, sometimes purple or red; ovary naked or bearing a few scales in some species; perianth long-persistent; fruit large, ripening slowly, ovoid to oblong, greenish or yellowish; seeds brown, lightly reticulate or nearly smooth.

A few other species occur in the United States, and one is found in Cuba.

Tubercles grooved to middle or a little below; ovary bearing scales with woolly axils.
Tubercles elongate, bright green ..... 1. C. macromeris.
Tubercles short, grayish green ..... 2. C. runyonii.
Tubercles grooved from tip to base; ovary naked.
Grooves of tubercles bearing large yellow or red glands.
Flowers white ..... 3. C. ottonis.
Flowers not white.
Stems globular.
Radial spines more or less recurved ..... 4. C. recurvata.
Radial spines spreading or ascending.
Spines dark, sometimes black ..... 5. C. poselgeriana.
Spines yellow or sometimes tinged with red.
Central spines slender and flexible ..... 6. C. muehlenpfordtii.
Central spines stout and rigid.
Radial spines subulate ..... 7. C. guerkeana.
Radial spines acicular ..... 8. C. echinoidea.
Stems cylindric.
Stems bluish green ..... 9. C. clava.
Stems yellowish green.
Central spine generally one.
Glands in groove red ..... 10. C. octacantha.
Glands in groove yellow ..... 11. C. exsudans.
Central spines 2 ..... 12. C. erecta.
Grooves of tubercles without large glands.
Outer perianth segments not ciliate.
Flowers purplish or rose ..... 13. C. elephantidens.

Flowers yellow or white.
Tubercles very large, broader than high----------14. C. bumamma.
Tubercles of medium size, if large longer than broad.
Plants large, often 8 cm. in diameter; seeds 3 mm. in diameter.
15. C. robustispina.
Plants smaller; seeds 2 mm. or less in diameter.
Central spines usually wanting.
Secondary cluster of spines developed in upper part of areoles and connivent at top----------16. C. connivens.
Secondary cluster of spines not developed.
Spines pectinate----------17. C. pectinata.
Spines not pectinate.
Spines 14 or more.
Spines slender, with long black tips----18. C. nickelsae.
Spines rather short, with light tips.
Spines subulate----------19. C. compacta.
Spines acicular----------20. C. radians.
Spines fewer than 14.
Spines slender and weak----------21. C. sulcolanata.
Spines not slender----------22. C. retusa.
Central spines one to several.
Central spines strongly hooked----------23 C. palmeri.
Central spines straight, or at most curved.
Central spines more or less curved.
Central spine one.
Radial spines nearly as long as the central.
24. C. cornifera.
Radial spines about half as long as the central.
25. C. salm-dyckiana.
Central spines several.
Radial spines 20 or more----------26. C. pallida.
Radial spines 12 or fewer----------27. C. pycnacantha.
Central spines straight.
Radial spines of two kinds (to be looked for here).
5. C. poselgeriana.
Radial spines of one kind----------28. C. durangensis.
Outer perianth segments ciliate.
Inner perianth segments very narrow----------29. C. neomexicana.
Inner perianth segments narrowly lanceolate--------30. C. aggregata.

1. **Coryphantha macromeris** (Engelm.) Lem. Cact. 35. 1868.

Mammillaria macromeris Engelm. in Wisliz. Mem. North. Mex. 97. 1848.

Mammillaria heteromorpha Scheer; Salm-Dyck, Cact. Hort. Dyck. 1849. 128. 1850.

Mammillaria dactylithele Labour. Monogr. Cact. 146. 1853.

Chihuahua to Zacatecas. Texas and New Mexico; type from Dona Ana, New Mexico.

Plant branching at base, often many-headed, up to 20 cm. long; tubercles large, soft, loosely arranged, elongate, 12 to 30 cm. long, grooved on upper side about two-thirds their length; spines 10 to 17, slender, the radials white; central spines several, black, the longer ones 5 cm. long; flowers large, purple, 6 to 8 cm. broad; scales on flower tube ciliate; ovary bearing a few scales with hairy axils; fruit 15 to 25 mm. long; seeds globose-obovate, brown but sometimes described as yellow, smooth.

2. **Coryphantha runyonii** Britt. & Rose, Cactaceae **4**: 26. 1923.

Along the Rio Grande in Texas, from Brownsville to Rio Grande City, and doubtless occurring on the Mexican side of the river.

Forming low clumps, sometimes 50 cm. in diameter, grayish green; tubercles 1 to 2 cm. long, terete or somewhat flattened, grooved above for half their length; radial spines 6 or more, spreading, acicular, 3 cm. long or less, sometimes all yellow or sometimes one or more brown; central spine on young plants solitary, on old plants sometimes 2 or 3, up to 6 cm. long; flowers purple, 6 cm. broad; outer perianth segments ciliate, the inner ones spatulate-oblong, acute; fruit green; seeds brown.

3. **Coryphantha ottonis** (Pfeiff.) Lem. Cact. 34. 1868.

Mammillaria ottonis Pfeiff. Allg. Gartenz. **6**: 274. 1838.

Mammillaria bussleri Mundt; Schum. Monatsschr. Kakteenk. **12**: 47. 1902.

Mammillaria golziana Haage, Monatsschr. Kakteenk. **19**: 100. 1909.

Central Mexico; type from Mineral del Monte, Hidalgo.

Simple, globular to short-cylindric, 12 cm. high or less, 8 cm. in diameter, glaucous to gray-green; radial spines 8 to 12, nearly equal, 8 to 10 mm. long; central spines 3 or 4, longer and a little stouter than the radials; axils of flowering tubercles woolly; flowers white, 4 cm. long; outer perianth segments oblong, obtuse, the inner ones apiculate.

4. **Coryphantha recurvata** (Engelm.) Britt. & Rose, Cactaceae **4**: 27. 1923.

Mammillaria recurvispina Engelm. Proc. Amer. Acad. **3**: 266. 1856. Not *M. recurvispina* De Vriese, 1839.

Mammillaria recurvata Engelm. Trans. Acad. St. Louis **2**: 202. 1863.

Sonora. Arizona.

Plant body depressed-globose, 10 to 20 cm. in diameter, often forming large masses 30 to 90 cm. in diameter and sometimes with over 50 heads; tubercles low; radial spines about 20, yellow to gray, with dark tips, pectinate, recurved; central spines 1, rarely 2, longer and darker than the radials, 12 to 20 mm. long, more or less reflexed, often appressed; flowers 25 to 35 cm. long, said to be brownish outside; inner perianth segments lemon-yellow.

5. **Coryphantha poselgeriana** (Dietr.) Britt. & Rose, Cactaceae **4**: 28. 1923.

Echinocactus poselgerianus Dietr. Allg. Gartenz. **19**: 346. 1851.

Echinocactus saltillensis Poselger, Allg. Gartenz. **21**: 101. 1853.

Echinocactus salinensis Poselger, Allg. Gartenz. **21**: 106. 1853.

Mammillaria difficilis Quehl, Monatsschr. Kakteenk. **18**: 107. 1908.

Mammillaria valida Purpus, Monatsschr. Kakteenk. **21**. 97. 1911. Not *M. valida* Weber. 1898.

Coahuila and Zacatecas; type from Saltillo, Coahuila.

Plant body large for the genus, globular, bluish green; tubercles large, closely packed together and at base strongly angled; radial spines of two kinds, the 4 or 5 lower ones spreading, subulate, reddish to black, about as long as the single central one (2 to 4 cm. long), the upper radials 5 to 8, ascending, yellowish with black tips, weak, acicular; flowers 4 to 5 cm. long and nearly as broad when expanded; flesh-colored; segments spatulate, usually rounded at apex; fruit oblong, 15 mm. long; seeds brownish.

6. **Coryphantha muehlenpfordtii** (Poselg.) Britt. & Rose, Cactaceae **4**: 28. 1923.

Mammillaria schecri Mühlenpf. Allg. Gartenz. **15**: 97. 1847. Not *M. schecri* Mühlenpf. 1845.

Echinocactus muehlenpfordtii Poselg. Allg. Gartenz. **21**: 102. 1853.

Chihuahua. Texas and New Mexico.

Plants nearly globular, usually simple, short-oblong, 20 cm. long, 7.5 to 15 cm. in diameter; tubercles 1 to 2.5 cm. long; axils of young tubercles grooved and young spine areoles very woolly; grooves bearing large dark-colored glands; spines variable, reddish to yellow with brown to black tips; radials 6 to 16, usually about 2 cm. long, straight; central spines 1 to 4, subulate, stouter than the radials, 3 to 3.5 cm. long, from nearly straight to curved at tip or even strongly hooked; flowers yellow, 6 cm. long; scales on flower tube and outer perianth segments more or less lacerate; inner perianth segments oblong, entire, acute; fruit greenish, oblong, 3 to 3.5 cm. long, naked; seeds 3 mm. long, brown, shining, smooth.

7. **Coryphantha guerkeana** (Bödeker) Britt. & Rose, Cactaceae 4: 29. 1923.
Mammillaria guerkeana Bödeker, Monatsschr. Kakteenk. 24: 52. 1914.
Durango.

Plant body globular, 6 to 7 cm. in diameter; tubercles bluish green, somewhat broader than thick, bearing a large red gland at the base of the groove and sometimes at the top; radial spines 9 to 12, yellow when young, spreading-bulbose at base, rather stout; central spines 3 or 4, rarely one of them stouter, often bent slightly at tip; flowering areoles very woolly; ovary oblong, naked.

8. **Coryphantha echinoidea** (Quehl) Britt. & Rose, Cactaceae 4: 30. 1923.
Mammillaria echinoidea Quehl, Monatsschr. Kakteenk. 23: 42. 1913.
Durango.

Plant solitary, globular or a little broader than high, 5 to 6 cm. in diameter, very woolly at apex; tubercles conic, 1.5 cm. high, 1.2 cm. broad at base; groove with 1 to 3 small grayish glands; areoles elliptic, woolly when young, glabrate in age; radial spines 20 to 25, 1.5 cm. long, white with darker tips; central spines 1 to 3, a little stouter than the radials, one of them porrect, horn-colored; flowers rose-colored, 6 to 8 cm. broad; perianth segments oblong, broad at apex, denticulate, sometimes mucronate.

9. **Coryphantha clava** Lem. Cact. 34. 1868.
Mammillaria clava Pfeiff. Allg. Gartenz. 8: 282. 1840.
Mammillaria schlechtendalii Ehrenb. Linnaea 14: 377. 1840.
Mexico.

Plant body club-shaped, deep green; axils of tubercles filled with white wool and with a red gland at base of the groove; tubercles erect, elongate, somewhat 4-sided; spine areoles white-villous; radial spines usually 7, straight, horn-colored, about equal; central spine 1, a little longer and stouter than the others; flowers very large, sometimes 9 cm. broad, pale yellow, the outer segments tinged with red; perianth segments glossy, linear-oblong to spatulate, the outer ones entire, the inner serrate and mucronate at apex.

10. **Coryphantha octacantha** (DC.) Britt. & Rose, Cactaceae 4: 30. 1923.
Mammillaria octacantha DC. Mém. Mus. Hist. Nat. 17: 113. 1828.
Mammillaria leucacantha DC. Mém. Mus. Hist. Nat. 17: 113. 1828.
Mammillaria lehmanii Otto; Pfeiff. Enum. Cact. 23. 1837.
Mammillaria macrothele Mart.; Pfeiff. Enum. Cact. 24. 1837.
Mammillaria plaschnickii Otto; Pfeiff. Enum. Cact. 24. 1837.
Mammillaria aulacothele Lem. Cact. Aliq. Nov. 8. 1838.
Mammillaria biglandulosa Pfeiff. Allg. Gartenz. 6: 274. 1838.
Mammillaria sulcimamma Pfeiff. Allg. Gartenz. 6: 274. 1838.
Mammillaria martiana Pfeiff. Linnaea 12: 140. 1838.
?*Mammillaria thelocamptos* Lehm. Linnaea 13: Lit. Ber. 101. 1839.
Mammillaria polymorpha Scheer; Mühlenpf. Allg. Gartenz. 14: 373. 1846.
Central Mexico.

Plant body simple, cylindric, 30 cm. high, 12 to 15 cm. in diameter; axils of tubercles bearing white wool, the groove with 1 or 2 red glands; tubercles elongate, up to 25 mm. long, spreading, somewhat 4-angled but with broad bases; radial spines 8, spreading, rigid, horn-colored with black tips, 10 to 12 mm. long; central spines 1 or 2, stouter than the radials, brownish, 25 mm. long; flowers about 6 cm. broad, straw-colored; perianth segments linear-oblong, obtuse.

11. **Coryphantha exsudans** (Zucc.) Lem.; Britt. & Rose, Cactaceae 4: 31. 1923.
Mammillaria exsudans Zucc.; Pfeiff. Enum. Cact. 15. 1837.
Mammillaria brevimamma Zucc.; Pfeiff. Enum. Cact. 34. 1837.
Mammillaria glanduligera Otto & Dietr. Allg. Gartenz. 16: 298. 1848.
Mammillaria asterias Cels; Salm-Dyck, Cact. Hort. Dyck. 1849. 129. 1850.
Mexico; type collected between Ixmiquilpan and Zimapán, Hidalgo.

Subcylindric, 4 cm. in diameter; tubercles dull green, thick, ovate; glands in the axils of the tubercles pale yellow; spine areoles somewhat tomentose, becoming naked; radial spines 6 or 7, 6 to 10 mm. long, slender, straight, spreading, yellow; central spines 1, erect, yellow, but brown at tip, perhaps hooked; flowers yellow.

12. **Coryphantha erecta** Lem. Cact. 34. 1868.
Mammillaria erecta Lem.; Pfeiff. Allg. Gartenz. 5: 370. 1837.
Mammillaria ceratocentra Berg, Allg. Gartenz. 8: 130. 1840.
Hildalgo.

Plant body cylindric, yellowish green; axils of young tubercles white-woolly; tubercles obliquely conic, somewhat rhombiform at base; radial spines 8 to 14, subulate, ascending, yellowish; central spines 2, the upper one short, the lower curved; flowers large, yellow; perianth segments very narrow.

13. **Coryphantha elephantidens** Lem. Cact. 35. 1868.
Mammillaria elephantidens Lem. Cact. Aliq. Nov. 1. 1838.
Central Mexico.

Simple, subglaucous, up to 14 cm. high and 19 cm. broad; tubercles very large, somewhat flattened, obtuse, 4 to 5 cm. long, densely woolly in their axils; areoles elliptic, when young woolly, in age naked; spines 8, all radial, somewhat unequal, subulate, the longest about 2 cm. long, spreading, when young brownish with yellowish bases, black at apex; flowers, rose-colored, 11 cm. broad; perianth segments numerous, narrowly oblong, apiculate.

14. **Coryphantha bumamma** (Ehrenb.) Britt. & Rose, Cactaceae 4: 33. 1923.
Mammillaria bumamma Ehrenb. Allg. Gartenz. 17: 243. 1849.
Morelos and Guerrero.

Globular or somewhat depressed; tubercles few, very large, rounded at apex, bluish green, very woolly in their axils when young but glabrate in age; spines 5 to 8, subulate, grayish brown, more or less recurved, 2 cm. long or more, all radial; flower yellow, 5 to 6 cm. broad; inner perianth segments narrowly oblong, obtuse or retuse.

15. **Coryphantha robustispina** (Schott) Britt. & Rose, Cactaceae 4: 33. 1923.
Mammillaria robustispina Schott; Engelm. Proc. Amer. Acad. 3: 265. 1856.
Mammillaria brownii Toumey, Bot. Gaz. 22: 253. 1896.
Sonora, the type from the south side of the Babuquibari Mountains. Arizona.

Stems simple or clustered, globular or a little longer than thick, broad, 5 to 15 cm. high, densely armed and almost hidden by the spines; tubercles 2.5 to 2.8 cm. long, arranged in 13 somewhat spiraled rows, fleshy, in age thickly set one against the other, becoming more or less dorsally flattened, pale grayish green, narrowly grooved; radial spines 12 to 15, the 3 lower ones very stout,

brownish; the upper generally weaker, the 2 or 3 uppermost much weaker, clustered closely together and very pale, some of them sometimes crowded toward the center; central spine solitary, very stout and erect or sometimes curved or even hooked, yellow, 3.5 cm. long; all the larger spines somewhat bulbous at the base; flowers 5 to 6 cm. long, salmon-colored; ovary 20 to 25 mm. long, bearing 4 to 7 minute caducous scales; fruit narrowly oblong, 6 cm. long; seeds 3 mm. long, brown, shining.

16. **Coryphantha connivens** Britt. & Rose, Cactaceae 4: 34. 1923.

Valley of Mexico, the type from Tlalpam.

Globular or somewhat depressed, 8 to 10 cm. broad, somewhat woolly at the crown at flowering time but becoming glabrate; spines all radial but of two kinds, one kind spreading or curved backward, subulate, horn-colored, 5 or 6, the others from the upper part of the spine areole, clustered, erect, or toward the top connivent, acicular, black at tip, 8 to 10; flowers yellow, 6 to 7 cm. broad; perianth segments narrowly oblong, acuminate; fruit greenish, oblong, 3 cm. long; seeds brown, 2 mm. long.

17. **Coryphantha pectinata** (Engelm.) Britt. & Rose, Cactaceae 4: 34. 1923.

Mammillaria pectinata Engelm. Proc. Amer. Acad. 3: 256. 1856.

Northern Mexico. Texas.

Usually simple, globose, 3 to 6 cm. in diameter; tubercles usually arranged in 13 spirals; upper tubercles 10 to 12 mm. long, about twice as long as the lower ones; areoles a little longer than broad; spines 16 to 24, all radial, those on the lower areoles appressed and often a little recurved, those from the upper part of the upper areoles 12 to 18 mm. long, connivent over the apex, yellowish white with black tips; flowers yellow, 5 cm. long; ovary 6 to 8 mm. long; fruit 12 mm. long.

18. **Coryphantha nickelsae** (K. Brandeg.) Britt. & Rose, Cactaceae 4: 35. 1923.

Mammillaria nickelsae K. Brandeg. Zoe 5: 31. 1900.

Nuevo León.

Described as globular, densely cespitose, often 7 cm. high, pale green and glaucous; older plants becoming purplish; tubercles almost hidden by the overlapping spines, rather broad at base, low, not densely arranged; spines 14 to 16, all radial (a few forming a small fascicle at the top of the groove), slender, at first simply spreading but afterward bent back and interlaced with those of the adjoining tubercles, 8 to 10 mm. long, at first yellowish at base with dark tips, but afterwards bleaching; flowers described as bright yellow, with a red center, 5 to 7 cm. broad; fruit nearly globular, 5 to 7 mm. long, green; seeds small, brown.

19. **Coryphantha compacta** (Engelm.) Britt. & Rose, Cactaceae 4: 36. 1923.

Mammillaria compacta Engelm. in Wisliz. Mem. North. Mex. 105. 1848.

Chihuahua, the type from Cosihuiriachi.

Plants solitary, somewhat depressed, 3 to 6 cm. high, 5 to 8 cm. broad; tubercles in 13 rows, much crowded, 8 mm. long, sulcate above; radial spines 13 to 16, rigid, appressed, interwoven with adjacent ones, whitish, 10 to 20 mm. long; central spines usually wanting; flowers 2 cm. long and broad, yellow; fruit oval; seeds smooth and yellow.

20. **Coryphantha radians** (DC.) Britt. & Rose, Cactaceae 4: 36. 1923.

Mammillaria radians DC. Mém. Mus. Hist. Nat. 17: 111. 1828.

Mammillaria impexicoma Lem. Cact. Aliq. Nov. 5. 1838.

Mammillaria daimonoceras Lem. Cact. Aliq. Nov. 5. 1838.

Central Mexico.

Simple, nearly globose, either obtuse or depressed at apex, 7.5 cm. in diameter; tubercles ovoid, large; axils of tubercles naked; areoles glabrate; spines all radial, 16 to 18, white or sometimes yellowish, 10 to 12 mm. long, rigid, tomentose when young; flowers lemon-yellow, with outer segments tinged with red, about 10 cm. broad, the segments narrowly oblong to spatulate, acute, somewhat toothed toward the apex. "Huevos de coyote" (*Patoni*).

21. Coryphantha sulcolanata Lem. Cact. 35. 1868.

Mammillaria sulcolanata Lem. Cact. Aliq. Nov. 2. 1838.

Mammillaria conimamma Linke, Allg. Gartenz. **25**: 239. 1857.

Mammillaria cornimamma N. E. Brown, Gard. Chron. III. **2**: 186. 1887.

Mexico, the range unknown; type said to have come from Mineral del Monte, Hidalgo.

Subglobose, somewhat depressed, cespitose, 5 cm. high, 6 cm. thick or more; tubercles somewhat 5-angled at base, subconic above, their axils very woolly when young; spines 9 or 10, all radial, unequal, 12 to 16 mm. long, the lower and upper weaker and shorter than the lateral ones, brownish with black tips but when young whitish yellow with purple tips; flowers 4 cm. long or more, widely spreading, 6 cm. broad or more; perianth segments oblong, acute.

22. Coryphantha retusa (Pfeiff.) Britt. & Rose, Cactaceae **4**: 38. 1923.

Mammillaria retusa Pfeiff. Allg. Gartenz. **5**: 369. 1837.

Oaxaca.

Plants depressed-globose, 5 to 10 cm. in diameter, the top very woolly; tubercles rather large; areoles elliptic; spines 6 to 12, all radial, appressed or even curved backward, yellowish to brownish, subulate except 2 or 3 aciculate ones at the upper part of areoles; flowers central, yellow, about 3 cm. long; inner perianth segments oblong, acute.

23. Coryphantha palmeri Britt. & Rose, Cactaceae **4**: 39. 1923.

Durango, Coahuila, and Zacatecas; type from Durango.

Plant body globular; tubercles closely set in about 13 rows but not very regularly arranged, pale green, not very flaccid; radial spines 11 to 14, rather stout, spreading nearly at right angles to the central one, yellowish, the tips often blackish; central spine one, stout, terete, hooked at apex; young areoles very woolly; flowers central, pale yellow to nearly white, about 3 cm. long; outer perianth segments linear-oblong, acute, brownish on the broad midrib, entire, the inner yellow throughout, acuminate.

24. Coryphantha cornifera (DC.) Lem. Cact. 35. 1868.

Mammillaria cornifera DC. Mém. Mus. Hist. Nat. **17**: 112. 1828.

Mammillaria pfeifferiana De Vriese, Tijdschr. Nat. Gesch. **6**: 51. 1839.

Mammillaria scolymoides Scheidw. Allg. Gartenz. **9**: 44. 1841.

Coahuila and Querétaro, and elsewhere in central Mexico.

Plant solitary, globose, pale green; tubercles short, broad, somewhat imbricate, 12 cm. high; radial spines 16 or 17, grayish, 10 to 12 mm. long; central spine 1, stout, erect or subincurved, generally dark-colored, 14 to 16 mm. long; flowers yellow, tinged with red, 7 cm. broad; inner perianth segments oblanceolate, acuminate.

25. Coryphantha salm-dyckiana (Scheer) Britt. & Rose, Cactaceae **4**: 39. 1923.

Mammillaria salm-dyckiana Scheer; Salm-Dyck, Cact. Hort. Dyck. 1849. 134. 1850.

Mammillaria delaetiana Quehl, Monatsschr. Kakteenk. **18**: 59. 1908.

Chihuahua.

Plants either solitary or in clusters, nearly globular or sometimes club-shaped, 10 to 15 cm. in diameter, light green; tubercles rather short, closely set; radial spines about 15, spreading, slender, 10 to 15 mm. long, grayish or whitish; central spines 1 to 4, reddish to black, the 3 upper ones when present ascending and those near the top of the plant connivent, the lowest central stouter than the others, 2 to 2.5 cm. long, porrect or curved downward; flowers 4 cm. long; outer perianth segments greenish or tinged with red, the inner pale yellow.

26. Coryphantha pallida Britt. & Rose, Cactaceae 4: 40. 1923.

Puebla, the type from Tehuacán.

Plant body either solitary or in clusters of 10 or more, globular, 12 cm. in diameter or less, bluish green; tubercles in 13 rows, short and thick, closely set; radial spines 20 or more, white, appressed; centrals usually 3, but sometimes more, the upper more or less ascending, the lower porrect or curved downward, with the tips black, or sometimes black throughout; flowers often 7 cm. long and nearly as broad; outer perianth segments narrow, greenish yellow, with a reddish stripe on the back; inner perianth segments pale lemon-yellow, broader than the outermost, acuminate; ovary bearing a few narrow scales; fruit greenish brown, 2 cm. long; seeds brown, shining.

27. Coryphantha pycnacantha (Mart.) Lem. Cact. 35. 1868.

? *Mammillaria latimamma* DC. Mém. Mus. Hist. Nat. **17**: 114. 1828.
Mammillaria pycnacantha Mart. Nov. Act. Nat. Cur. **16**: 325. 1832.
? *Mammillaria acanthostephes* Lehm. Allg. Gartenz. **3**: 228. 1835.
Mammillaria arietina Lem. Cact. Aliq. Nov. 10. 1838.
Mammillaria scepontocentra Lem. Cact. Hort. Monv. 43. 1839.
Mammillaria winkleri Först. Allg. Gartenz. **15**: 50. 1847.

Oaxaca, the type from Oaxaca City.

Plant body solitary, globular to cylindric, about 8 cm. high; tubercles broad, grooved above, glaucous-green; radial spines 10 to 12, slender, 10 to 16 mm. long; central spines about 4, stouter than the radials, about 25 mm. long, more or less curved backward, usually black; flowers from near the center of the plant, 25 mm. in diameter, yellowish; perianth segments numerous, very narrow.

28. Coryphantha durangensis (Rünge) Britt. & Rose, Cactaceae 4: 42. 1823.

Mammillaria durangensis Rünge; Schum. Gesamtb. Kakt. 478. 1898.

Northern Mexico; type from Villa Lerdo, Durango.

Plants solitary or in small clusters, short-cylindric, 10 cm. long or less, somewhat glaucous; tubercles rather prominent, in 5 to 8 series, somewhat compressed dorsally, very woolly in the axils; radial spines 6 to 8, acicular, spreading, 1 cm. long or less; central spines solitary, often erect, those of the uppermost areoles connivent, black; flowers about 2 cm. long, when fully expanded 2.5 to 4 cm. broad; outer perianth segments dark purple or with only a purple stripe down the center; inner perianth segments cream-colored to pale lemon-yellow; fruit globular, 5 to 8 mm. in diameter, naked, greenish; seeds brown, about 1 mm. broad.

29. Coryphantha neomexicana (Engelm.) Britt. & Rose, Cactaceae 4: 45. 1923.

Mammillaria vivipara radiosa neomexicana Engelm. Proc. Amer. Acad. **3**: 269. 1856.
Mammillaria neomexicana A. Nels; Coult. & Nels. Man. Rocky Mount. 237. 1909.

Chihuahua. Texas and New Mexico.

Plants usually solitary, globular to short-oblong, 8 to 12 cm. long, the whole body usually hidden under a mass of spines; radial spines numerous, acicular, usually white; central spines several, much stouter than the radials, pale below, brown or black toward the top; flowers 4 to 5 cm. broad when fully expanded; outer perianth segments greenish or the ones nearer the center purplish, ciliate; inner perianth segments broadly linear, acuminate and apiculate, more or less serrate above; fruit 2.5 cm. long, green, juicy, naked except a few hairy scales near the top, capped by the withered perianth, depressed at apex.

30. Coryphantha aggregata (Engelm.) Britt. & Rose, Cactaceae **4**: 47. 1923.

Mammillaria aggregata Engelm. in Emory, Mil. Reconn. 157. 1848.

Sonora. Arizona, the type from the headwaters of the Gila.

Plants solitary or cespitose, globular to short-oblong, very spiny; radial spines numerous, white, often with brown tips, appressed; central spines several, stout, all erect and appressed or one often porrect, those toward the top of the plant connivent; flowers very large and showy, purplish, 5 to 7 cm. broad; outer perianth segments ciliate, the inner narrowly oblanceolate, often 6 mm. broad, acuminate; fruit green, oblong, 2 to 2.5 cm. long, naked or occasionally bearing a small scale on the side, juicy; seeds dark brown, 2 mm. long.

DOUBTFUL SPECIES.

The following plants, described as species of *Mammillaria*, probably belong to this genus.

MAMMILLARIA CORDIGERA Hesse, Gartenflora **59**: 445. 1910. Doubtless a native of Mexico.

MAMMILLARIA CORNUTA Hildmann; Schum. Gesamtb. Kakt. 496. 1898. Native of Mexico.

MAMMILLARIA POTOSIANA Jacobi, Allg. Gartenz. **24**: 92. 1856. Type from San Luis Potosí.

MAMMILLARIA RECURVISPINA De Vriese, Tijdschr. Nat. Gesch. **6**: 53. 1839. Described from Mexico.

45. ESCOBARIA Britt. & Rose, Cactaceae 4: 53. 1923.

Globose or cylindric, usually cespitose cacti, never milky; tubercles grooved above, persisting as knobs at the base of old plants after the spines have fallen; spines both central and radial, never hooked; flowers small, regular, appearing from the top of the plant at the bottom of the groove of young tubercles; stamens and style included; fruit red, naked (or with one scale), indehiscent, globular to oblong, crowned by the withering perianth; seeds brown to black, the aril basal or subventral, oval.

Two other species occur in Texas.

Outer perianth segments not ciliate.....**6. E. lloydii.**
Outer perianth segments ciliate.
  Flowers 2 to 2.5 cm. long.
    Plants elongate; seeds small, brown.....**1. E. tuberculosa.**
    Plants usually globose; seeds larger, black.....**2. E. dasyacantha.**
  Flowers 1.5 cm. long.
    Inner perianth segments pointed.
      Inner perianth segments broad.....**3. E. chihuahuensis.**
      Inner perianth segments narrow.....**4. E. runyonii.**
    Inner perianth segments obtuse.....**5. E. chaffeyi.**

1. Escobaria tuberculosa (Engelm.) Britt. & Rose, Cactaceae 4: 54. 1923.
Mammillaria strobiliformis Scheer; Salm-Dyck, Cact. Hort. Dyck. 1849. 104. 1850. Not *M. strobiliformis* Engelm. 1848.
Mammillaria tuberculosa Engelm. Proc. Amer. Acad. 3: 268. 1856.
Northern Mexico. Southwestern United States.

Usually growing in clumps, cylindric, or becoming so, 5 to 18 cm. high, 2 to 6 cm. in diameter; tubercles more or less regularly arranged in spirals, 6 mm. long; radial spines numerous, white, sometimes as many as 30, acicular, 4 to 15 mm. long; central spines several, stouter than the radials, brown to blackish or colored only at the tips, one of them usually porrect; flowers 2.5 cm. in diameter when fully expanded, light pink; outer perianth segments acute, ciliate, the inner narrowly pointed; fruit oblong, up to 20 mm. long, red; seeds brownish, pitted, with a small ventral hilum.

2. Escobaria dasyacantha (Engelm.) Britt. & Rose, Cactaceae 4: 55. 1923.
Mammillaria dasyacantha Engelm. Proc. Amer. Acad. 3: 268. 1856.
Northern Chihuahua. Texas and New Mexico, the type from El Paso.

Globose to short-oblong, usually 4 to 7 cm. in diameter but sometimes 20 cm, long; radial spines 20 or more, white, bristle-like; central spines about 9, stouter and longer than the radials, the upper half usually reddish or brownish, often 2 cm. long; flowers pinkish; perianth segments narrowly oblong, apiculate; fruit clavate, scarlet, 15 to 20 mm. long; seeds black, 1 mm. in diameter, slightly flattened, pitted, with a narrow white subbasal hilum.

3. Escobaria chihuahuensis Britt. & Rose, Cactaceae 4: 55. 1923.
Chihuahua.

Plants often solitary, perhaps also cespitose, globose to short-cylindric, very spiny; tubercles short, usually hidden by the spines; radial spines numerous, spreading; central spines several, longer than the radials, usually brown or black in the upper part; flowers 1 to 1.5 cm. long, purple; outer perianth segments broad, often rounded at apex, with ciliate margins; inner perianth segments pointed.

4. Escobaria runyonii Britt. & Rose, Cactaceae 4: 55. 1923.
Type from Reynosa, Tamaulipas. Texas.

Cespitose, with numerous (sometimes 100) globose to short-oblong heads, gray-green, 3 to 5 cm. long; tubercles 5 mm. long, terete in section, with very narrow groove above; groove at first white-woolly, not glandular; radial spines numerous, acicular, white, 4 to 5 mm. long; central spines stouter than the radials, 5 to 7, slightly spreading, with brown or black tips, 6 to 8 mm. long; flowers 1.5 cm. long, pale purple, the segments with a dark purple stripe down the middle, with pale margins; outer perianth segments narrow-oblong, with thin ciliate margins, the inner narrower than the outer, with margins entire, acute; fruit scarlet, globose to short-oblong, 6 to 9 mm. long, juicy.

5. Escobaria chaffeyi Britt. & Rose, Cactaceae 4: 56. 1923.
Zacatecas, the type from Cedros.

Short-cylindric, 6 to 12 cm. long, 5 to 6 cm. in diameter, almost covered by the numerous white spines; tubercles rather short, light green, with a narrow groove above; radial spines numerous, spreading, bristly; central spines several, a little shorter than the radials and brown or black-tipped; flowers 15 mm. long, cream-colored or sometimes purplish; outer perianth segments ciliate, the inner oblong, obtuse, entire; fruit crimson, 2 cm. long.

6. **Escobaria lloydii** Britt. & Rose, Cactaceae 4: 57. 1923.

Zacatecas, the type from the Sierra Zuluaga.

Plants growing in clumps and resembling a small species of *Echinocereus;* old plants bearing naked corky tubercles; radial spines about 20, spreading, slender, white; central spines several, stout, with black or brownish tips, 2 cm. long; flowers greenish, with a central stripe on the outside, 2.5 cm. long; fruit red, globose to short-oblong, 6 to 12 mm. long; seeds black, pitted, globose, 1 mm. in diameter.

DOUBTFUL SPECIES.

MAMMILLARIA EMSKOETTERIANA Quehl, Monatsschr. Kakteenk. 20: 139. 1910. Perhaps a species of *Escobaria.* Type supposed to have come from San Luis Potosí.

46. BARTSCHELLA Britt. & Rose, Cactaceae 4: 57. 1923.

A single species is known.

1. **Bartschella schumannii** (Hildm.) Britt. & Rose, Cactaceae 4: 58. 1923.

Mammillaria schumannii Hildm. Monatsschr. Kakteenk. 1: 125. 1891.

Mammillaria venusta K. Brandeg. Zoe 5: 8. 1900.

Southern Baja California.

More or less cespitose (as many as 40 stems have been reported in a single cluster), 6 cm. high or less; axils slightly woolly, without bristles; radial spines 9 to 15, stout, 6 to 12 mm. long, brownish above, glabrous; central spines usually 1, sometimes 2 or 3, one of these usually hooked; in seedlings 10 or 11 radial spines developing, these spreading, feather-like, with long spreading hairs; in plant one year old the spines simply puberulent, all white with brown tips and one central much longer than the others and strongly hooked; flowers 3 to 4 cm. in diameter, the segments about 10, lance-acuminate; stamens numerous, erect, shorter than the style; style slender, erect, pale; stigma lobes 6, linear, green; fruit short, dull; seeds usually found in a cup in between the tubercles, less than 1 mm. long.

47. PELECYPHORA Ehrenb. Bot. Zeit. 1: 737. 1843.

A single species is known.

1. **Pelecyphora aselliformis** Ehrenb. Bot. Zeit. 1: 737. 1843.

San Luis Potosí.

Tufted, cylindric, 5 to 10 cm. high, 2.5 to 5 cm. in diameter, covered with tubercles arranged in spirals; tubercles strongly flattened laterally, somewhat stalked at base; areoles at top of the tubercles very long and narrow, crowned by an elongate scale-like spine with numerous lateral ridges usually free at tip, giving a peculiar pectinate appearance; flowers 3 cm. broad or more, campanulate; perianth segments in 4 rows, the outer ones sometimes white, oblong, acute; flower tube proper very short; stamens borne at the top of the flower tube, much shorter than the perianth segments; stigma lobes 4, erect; seeds 1 mm. broad, kidney-shaped. "Peyote," "peyotillo."

The plant is employed locally as a remedy for fevers.

48. DOLICHOTHELE Britt. & Rose, Cactaceae 4: 61. 1923.

Plant body globose, more or less cespitose, soft in texture, never milky; tubercles elongate, not grooved above; flowers borne in the axils of old tubercles, very large, with a definite funnel-shaped tube; inner perianth segments yellow, spatulate, tapering into a claw and borne on the top of the tube; stamens forming a spiral about the style and borne on the whole face of the throat

but forming a definite ring at the top of the throat; style slender; stigma lobes linear; ovary exserted, naked; fruit smooth, greenish, purplish, or red, globose, ellipsoid or short-oblong; seeds black.

Only three species are known.

Spines glabrous, even when very young----------1. **D. sphaerica.**
Spines puberulent.
Tubercles very long (up to 5 cm.), pale green, glaucous; radial spines 6 to 12; central spines usually present----------2. **D. longimamma.**
Tubercles much shorter, bright green; radial spines 3 or 4; central spines none----------3. **D. uberiformis.**

1. **Dolichothele sphaerica** (Dietr.) Britt. & Rose, Cactaceae 4: 61. 1923.
Mammillaria sphaerica Dietr.; Poselg. Allg. Gartenz. 21: 94. 1853.
Northern Mexico. Texas, the type from Corpus Christi.

Low and depressed, often growing in large cespitose masses 20 cm. in diameter, with a large thickened root; tubercles soft and turgid, resembling those of the following species but shorter, 12 to 16 mm. long; areoles small, circular, at first short-lanate; spines 12 to 15, glabrous, generally pale yellow, a little darker at base at first, in age darker, often reddish, 7 to 9 mm. long, spreading or a little curved backward; central spine 1, straight; flowers appearing toward the top of the plant but not from the axils of the younger tubercles, with a rotate limb 6 to 7 (?) cm. broad; inner perianth segments widely spreading, oblanceolate, acute to apiculate, tapering at base into a slender claw; fruit greenish white to purplish, short-oblong, 10 to 15 mm. long, juicy, very fragrant; seeds black.

2. **Dolichothele longimamma** (DC.) Britt. & Rose, Cactaceae 4: 62. 1923.
Mammillaria longimamma DC. Mém. Mus. Hist. Nat. 17: 113. 1828.
Mammillaria melaleuca Karw.; Salm-Dyck, Cact. Hort. Dyck. 1849. 108. 1850.
Mammillaria globosa Link, Allg. Gartenz. 25: 240. 1857.
Tamaulipas and central Mexico.

Solitary or cespitose, about 10 cm. high; tubercles elongated, 5 cm. long, somewhat glaucous, their axils hairy or naked; spine areoles with white hairs when young, in age naked; radial spines 5 to 12, widely spreading, acicular, 2.5 mm. long, white to pale yellow, swollen and darker at base, puberulent; central spines 1 to 3, usually solitary, porrect, similar to the radials but usually darker with a blackish tip; flowers citron-yellow, 4 to 6 cm. long.

3. **Dolichothele uberiformis** (Zucc.) Britt. & Rose, Cactaceae 4: 63. 1923.
Mammillaria uberiformis Zucc.; Pfeiff. Enum. Cact. 23. 1837.
Mammillaria laeta Rümpler; Först. Handb. Cact. ed. 2. 247. 1885.
Central Mexico, the type from Pachuca, Hidalgo.

Globose, about 7.5 cm. high and 10 cm. in diameter; tubercles elongate, 2.5 to 3 cm. long, 12 to 15 mm. in diameter, dull green, shining, their axils naked; spine areoles nearly naked; spines 3 or 4, all radial, puberulent, horn-colored to reddish, nearly equal; flowers yellow, 3 cm. broad; outer perianth segments reddish, the inner in 2 series, oblong, acute.

49. SOLISIA Britt. & Rose, Cactaceae 4: 64. 1923.

The genus consists of a single species. It was named for Don Octavio Solís, of Mexico City.

1. **Solisia pectinata** (Stein) Britt. & Rose, Cactaceae 4: 64. 1923.
Pelecyphora pectinata Stein, Gartenflora 34: 25 1885.
Mammillaria pectinifera Weber, Dict. Hort. Bois 804. 1898.
Puebla.

Plants 1 to 3 cm. in diameter, fibrous-rooted, entirely hidden by the large overlapping spine clusters; areoles narrow and long; spines 20 to 40, all radial, 1.5 to 2 mm. long, white, appressed; flowers small, lateral, yellow, borne in the axils of old tubercles; fruit small, naked, oblong; seeds 1 mm. long, black, smooth.

50. NEOMAMMILLARIA Britt. & Rose, Cactaceae 4: 65. 1923.

Plants globose, depressed-globose, or short-cylindric, occasionally much elongate, some with milky, others with watery juice; tubercles arranged in more or less spiraled rows, never on vertical ribs, terete, angled, or sometimes flattened, never grooved on the upper surface, usually bearing wool or hairs and sometimes bristles but without glands in their axils and crowned by the spine areoles; spines in clusters on the top of the tubercle, sometimes all alike, sometimes with central ones very different from the radial, all straight or sometimes one or more of the central spines hooked; flowers, so far as known, diurnal, from axils of the old tubercles, much alike as to size and shape, more or less campanulate, comparatively small, variously colored, commonly red, yellowish, or white to pinkish; perianth segments rather narrow, spreading; stamens numerous, borne on the base of the perianth tube, short, included; style about the length of the stamens; stigma lobes linear; fruit usually clavate, rarely if ever globose, usually ripening rapidly, naked, scarlet; seeds brown in some species, black in others.

Besides the species here listed about 20 others are found in the southwestern United States, West Indies, Central America, and Venezuela.

The names "biznaguita," "huevos de coyote," and "chilitos" (fruits) are reported from Mexico for species of uncertain determination. According to Hernández, the milky sap of some species was employed to remove warts. The Tewa Indians of New Mexico are reported to eat the plants raw.

A. Plants with none of the spines hooked.
  B. Seeds brown.
    C. Tubercles giving off milk freely when cut.
      D. Axils of tubercles without bristles.
        E. Tubercles more or less elongate.
          Tubercles terete throughout.
            Central spines 1 or 2.
              Central spines about as long as the radials----1. N. gaumeri.
              Central spines much longer than the radials---2. N. petrophila.
            Central spines 4 to 7.
              Outer perianth segments entire; central spines long and slender----------3. N. arida.
              Outer perianth segments erose; central spines not elongate, stouter----------4. N. brandegeei.
          Tubercles more or less angled.
            Tubercles nearly terete toward apex.
              Outer perianth segments and scales more or less fimbriate. 5. N. gummifera.
              Outer perianth segments and scales entire.
                Radial spines white; flowers pinkish----------6. N. heyderi.
                Radial spines brownish; flowers white to cream-colored. 7. N. hemisphaerica.

Tubercles angled to the tip.
Spines very unequal, some much elongate.
Spines whitish----8. N. phymatothele.
Spines horn-colored, reddish, or black.
Plants without definite central spine.
Spines horn-colored, short, curved--9. N. magnimamma.
Spines reddish, long----10. N. macracantha.
Plants with definite central spines.
Central spines 2----11. N. johnstonii.
Central spines solitary.
Central spine 2 to 3 cm. long; perianth segments linear----12. N. melanocentra.
Central spine 1 cm. long; perianth segments oblong----13. N. runyonii.
Spines nearly equal, at least none of them much elongate.
Flowers red to pinkish.
Outer perianth segments ciliate----14. N. sartorii.
Outer perianth segments not ciliate (so far as known).
Central spines none.
Spines pinkish, with black tips----15. N. seitziana.
Spines straw-colored throughout----16. N. ortegae.
Central spines 1 or 2.
Central spine solitary; radial spines nearly equal. 17. N. meiacantha.
Central spines 2; some of the radials very short. 18. N. scrippsiana.
Flowers yellowish.
Central spines 4 to 6----19. N. gigantea.
Central spines wanting----20. N. peninsularis.
EE. Tubercles very short, symmetric.
Plants globose or depressed.
Axils of tubercles naked----21. N. flavovirens.
Axils of tubercles woolly.
Spines partly deciduous----22. N. sempervivi.
Spines not deciduous.
Central spines present----23. N. obscura.
Central spines wanting----24. N. crocidata.
Plants cylindric or ovoid.
Central spines wanting.
Tubercles nearly terete----25. N. polythele.
Tubercles 4-angled.
Tubercles pointed; axils very woolly----26. N. carnea.
Tubercles not pointed; axils not very woolly--27. N. lloydii.
Central spines several.
Radial spines reduced to short bristles----28. N. zuccariniana.
Radial spines more elongate----29. N. formosa.
DD. Axils of tubercles with bristles as well as wool.
Spines partly elongate, curved, and flexious.
Plants without definite central spines----30. N. compressa.
Plants with central spines.
Central spines weak----31. N. mystax.
Central spines stiff----32. N. petterssonii.

Spines not elongate or, if so, not flexuous.
Tubercles terete or nearly so.
Spines all radial——33. N. karwinskiana.
Spines both radial and central.
Radial spines numerous, 12 or more.
Central spines reddish, not much longer than the radials.
Outer perianth segments ciliate——34. N. standleyi.
Outer perianth segments setose——35. N. evermanniana.
Central spines usually white except at tip, much elongate.
Flowers yellow——36. N. parkinsonii.
Flowers dark red——37. N. geminispina.
Radial spines few, 5 to 9.
Spines black when young——38. N. pyrrhocephala.
Spines brownish or lighter——39. N. collinsii.
Tubercles strongly angled.
Spines both radial and central.
Radial spines numerous——40. N. chinocephala.
Radials spines few, bristle-like.
Central spines 4 to 6 ——41. N. tenampensis.
Central spines 2——42. N. polygona.
Spines all of one kind, few.
Flowers yellow——43. N. confusa.
Flowers rose-colored or white.
Flowers rose-colored.
Plants globose; stigma lobes 4 or 5——44. N. villifera.
Plants cylindric; stigma lobes 8——45. N. polyedra.
Flowers white——46. N. conzattii.

CC. Tubercles not giving off milk when cut, the milk tubes developed, if at all, only in the stem proper.
Central spines wanting.
Spines subulate; areoles elliptic——47. N. napina.
Spines acicular; areoles circular.
Spines numerous——48. N. lanata.
Spines few (4 to 6).
Spines 5 or 6, short, straight——49. N. kewensis.
Spines 4, elongate, curved.
Flowers large (2.5 cm. broad)——50. N. subpolyedra.
Flowers small.
Spines long and weak——51. N. galeottii.
Spines subulate——52. N. tetracantha.
Central spines present.
Central spines usually 2, sometimes solitary.
Radial spines 20 or more.
Central spines stout and not very long.
Plant round or nearly so at apex; central spines often 1.
53. N. elegans.
Plant strongly umbilicate; central spines always 2.
54. N. pseudoperbella.
Central spines long——55. N. dealbata.
Radial spines 20 or fewer.
Radial spines white, bristle-like.

Stigma lobes red.
Plants globose or somewhat elongate_____56. N. haageana.
Plants depressed-globose_____57. N. perbella.
Stigma lobes white.
Radial spines appressed_____58. N. collina.
Radial spines not appressed_____59. N. donatii.
Radial spines brownish when young, stouter____60. N. mundtii.
Central spines usually 4, sometimes more.
Central spines white or yellow.
Radial spines white.
Plants globose.
Axils of tubercles not setose; central spines usually 4, rarely as many as 7_____61. N. celsiana.
Axils of tubercles setose; central spines usually 9.
62. N. aureiceps.
Plants cylindric_____63. N. yucatanensis.
Radial spines yellow.
Plants globular_____64. N. pringlei.
Plants slender-cylindric_____65. N. cerralboa.
Central spines brown or black.
Central spines black_____66. N. phaeacantha.
Central spines brown.
Axils of tubercles not setose_____67. N. graessneriana.
Axils of tubercles setose.
Tubercles closely set.
Central spines not very different from the radial.
Plant body more or less elongate; spines brownish or reddish _____68. N. spinosissima.
Plant body globose; radial spines whitish.
69. N. densispina.
Central spines very different from the radial.
70. N. nunezii.
Tubercles spreading.
Central spines unequal; stigma lobes green.
71. N. amoena.
Central spines nearly equal; stigma lobes rose-colored.
72. N. rhodantha.
B. Seeds black. Neither tubercles nor stems milky.
Spines plumose_____73. N. plumosa.
Spines not plumose.
Radial spines weak and hairlike_____74. N. multiceps.
Radial spines not hairlike.
Spines yellow.
Spines 2 to 8, glabrous, more or less twisted or bent.
75. N. camptotricha.
Spines about 20, pubescent, straight_____76. N. eriacantha.
Spines not yellow.
Spines 25 to 80.
Spines pubescent or lanate.
Spines lanate, 25 to 30_____77. N. schiedeana.
Spines pubescent or puberulent_____78. N. lasiacantha.
Spines not pubescent.

Spines all very much alike.
Perianth segments obtuse——79. N. denudata.
Perianth segments pointed.
Flowers about 7 mm. long——80. N. lenta.
Flowers about 20 mm. long——81. N. candida.
Spines unlike, the centrals unlike the others——82. N. vetula.
Spines 20 or fewer.
Plants globose.
Flowers red——83. N. fertilis.
Flowers white.
Central spines solitary; radials 7 to 9——84. N. decipiens.
Central spines 5 to 8; radials 16 to 20——85. N. discolor.
Plants cylindric.
Joints very fragile, breaking loose when touched or jarred.
86. N. fragilis.
Joints not fragile.
Spines all radial and recurved——87. N. elongata.
Spines both radial and central.
Axils of tubercles not bristly.
Spines all yellow——88. N. echinaria.
Spines not yellow.
Upper central spines more or less connivent over the top of plant——89. N. pottsii.
Upper central spines not connivent over the top of plant——90. N. mazatlanensis.
Axils of tubercles bristly.
Stems slender-cylindric or globose; species of central Mexico——91. N. sphacelata.
Stems short-cylindric or globose; species of Baja California.
Spines nearly white or at least becoming so; seeds minute.
Spines all white or nearly so; spine areoles at first lanate——92. N. albicans.
Spines tan-colored with dark tips; spine areoles not lanate——93. N. slevinii.
Spines not white; seeds 3 mm. long——94. N. palmeri.

AA. Plants with some of the central spines hooked.
Tubercles milky; seeds brown.
Plants globose——95. N. uncinata.
Plants cylindric——96. N. hamata.
Tubercles never milky; seeds black (except in Nos. 97 and 98).
Seeds brown.
Fruit red; flowers from side of plant——97. N. rekoi.
Fruit green; flowers from near base of plant——98. N. solisii.
Seeds black.
Fruit depressed, long-persisting——131. N. longiflora.
Fruit elongate, clavate, ripening quickly.
Seeds rugose——130. N. nelsonii.
Seeds not rugose.
F. Plants usually small; spines setaceous to delicately acicular.

Central spines yellow.
Central spines glabrous----99. N. pygmaea.
Central spines pubescent.
Flowers white----100. N. wildii.
Flowers yellowish----101. N. seideliana.
Central spines red to brown.
Outer perianth segments ciliate.
Central spines shorter than the flower; perianth segments acute----102. N. barbata.
Central spines longer than the flower; perianth segments obtuse----103. N. mercadensis.
Outer perianth segments entire.
Axils of tubercles setose.
Inner perianth segments white to yellowish.
Central spines 3 or 4.
Radial spines about 25; flowers 2 cm. long. 104. N. kunzeana.
Radial spines about 20; flowers 1 cm. long. 105. N. hirsuta.
Central spines 7 to 9----106. N. multihamata.
Inner perianth segments red or reddish.
Radial spines weak and hairlike.
Central spines several----107. N. longicoma.
Central spines solitary----108. N. bocasana.
Radial spines stiff.
Radial spines glabrous----109. N. multiformis.
Radial spines pubescent----110. N. scheidweileriana.
Axils of tubercles not setose.
Flowers 2.2 cm. long or more.
Central spines solitary----111. N. saffordii.
Central spines 3----112. N. schelhasei.
Flowers 1 to 1.5 cm. long.
Plants cespitose----113. N. glochidiata.
Plants solitary.
Inner perianth segments acuminate. 114. N. trichacantha.
Inner perianth segments merely acute. 115. N. painteri.

FF. Plants stout; at least the central spines stout-acicular to subulate.
Outer perianth segments ciliate.
Perianth rotate; stigma lobes red----116. N. mainae.
Perianth campanulate; stigma lobes green.
Flowers white----117. N. boedekeriana.
Flowers purple to pinkish.
Radial spines often as many as 30----118. N. microcarpa.
Radial spines often as few as 12----119. N. sheldonii.
Outer perianth segments not ciliate.
Bristles (sometimes only one, sometimes many) present in axils of the tubercles.

Seeds constricted above the base.
Flowers greenish or pink.
Flowers greenish, 10 to 12 mm. long; central spines yellowish to reddish——120. N. armillata.
Flowers pink, 20 mm. long; central spines dark brown.
121. N. fraileana.
Flowers nearly white——122. N. swinglei.
Seeds not constricted above the base.
Central spines several; flowers yellowish——123. N. dioica.
Central spines usually solitary; flowers rose-colored.
124. N. goodridgei.
Bristles none in the axils of the tubercles.
Flowers rotate——125. N. zephyranthoides.
Flowers campanulate.
Plants globose.
Flowers white——126. N. carretii.
Flowers pink to purplish.
Inner perianth segments obtuse——127. N. jaliscana.
Inner perianth segments acute to acuminate.
128. N. bombycina.
Plants slender, elongate, and cylindric.
129. N. occidentalis.

1. **Neomammillaria gaumeri** Britt. & Rose, Cactaceae 4: 72. 1923.

Yucatán; type from sand dunes of Progreso.

Cespitose, the branches short, globose to short-cylindric, up to 15 cm. long; tubercles dark green, short, nearly terete, obtuse, the axils naked even when young, 5 to 7 mm. long, very milky; spine areoles conspicuously white-woolly at first, soon naked; radial spines 10 to 12, spreading, acicular, white with brown tips, or the lower ones in the cluster darker, 5 to 7 mm. long; central spine solitary, porrect, usually brown; flowers very abundant from near the top of the plant but not from the axils of young areoles, creamy white, 10 to 14 mm. long; outer perianth segments greenish, brown-tipped; scales on flower tube broadly ovate, scarious; fruit crimson, clavate, 18 to 20 mm. long, naked.

2. **Neomammillaria petrophila** (T. S. Brandeg.) Britt. & Rose, Cactaceae 4: 73. 1923.

Mammillaria petrophila T. S. Brandeg. Zoe 5: 193. 1904.

Mountains of southern Baja California; type from Sierra de la Laguna.

Sometimes cespitose, milky, globular, 15 cm. in diameter or less; tubercles short, broad at base; spines at first chestnut-colored, becoming pale in age; radial spines 10, about 1 cm. long, a little spreading; central spine 1 (rarely 2), 2 cm. long, darker and stouter than the radials; flowers bright greenish yellow, 18 to 20 mm. long; perianth segments hardly acute, sometimes slightly erose; fruit small, roundish; seeds reddish, smooth, less than 1 mm. long.

3. **Neomammillaria arida** (Rose) Britt. & Rose, Cactaceae 4: 73. 1923.

Mammillaria arida Rose; Quehl, Monatsschr. Kakteenk. 23: 181. 1913.

Southern Baja California; type from hills near Pichilinque Island, near La Paz.

Plants usually single, globular, 3 to 6 cm. in diameter, containing much milk and giving it off freely when injured; tubercles nearly terete; radial spines about 15, pale, ascending, the bases sometimes yellowish and the tip dark; central spines 4 to 7, 12 to 16 mm. long, much longer than the radials,

dark brown, erect; flowers 1 cm. long; outer perianth segments dark purple with lighter margins, entire, the inner cream-colored to almost pale yellow; fruit clavate, red, 15 cm. long; seeds brown.

4. **Neomammillaria brandegeei** (Coulter) Britt. & Rose, Cactaceae 4: 73. 1923.
   Cactus brandegeei Coulter, Contr. U. S. Nat. Herb. 3: 96. 1894.
   Cactus gabbii Coulter, Contr. U. S. Nat. Herb. 3: 109. 1894.
   Mammillaria gabbii Engelm.; K. Brandeg. Erythea 5: 116. 1897.
   Mammillaria brandegeei K. Brandeg. Erythea 5: 116. 1897.
   Baja California; type from San Jorge.

   Cylindric to globular, flattened, solitary or in clusters of 2 to 8; tubercles angled; axils woolly; radial spines 9 to 16, 8 to 10 mm. long, yellowish brown; central spines 3 to 6, a little longer and darker than the radials; flowers 15 mm. long; outer perianth segments ovate, striate, ciliate, the inner greenish yellow, narrower, entire; fruit white (according to Schumann), bearing a few narrow scales.

5. **Neomammillaria gummifera** (Engelm.) Britt. & Rose, Cactaceae 4: 74. 1923.
   Mammillaria gummifera Engelm. in Wisliz. Mem. North. Mex. 105. 1848.
   Chihuahua; type from Cosihuiriachi.

   Depressed-globose, 8 to 12 cm. in diameter; tubercles light green, milky, somewhat 4-angled; axils of tubercles and spine areoles somewhat white-tomentose when young; radial spines 10 to 12, ascending, white with brownish or even blackish tips, the lower ones stouter and longer than the others, often 2 to 2.5 cm. long and somewhat recurved; central spines 1 or 2, sometimes 4; flowers 3 cm. long, brownish red outside; inner perianth segments reddish white with dark red band in middle.

6. **Neomammillaria heyderi** (Mühlenpf.) Britt. & Rose, Cactaceae 4: 75. 1923.
   Mammillaria heyderi Mühlenpf. Allg. Gartenz. 16: 20. 1848.
   Northern Mexico. Texas.

   Plant globose or somewhat flattened at apex; tubercles conic, 12 mm. long, when young bearing wool in their axils; young spine areoles white-woolly; radial spines 20 to 22, white, setaceous, the lower ones stouter and longer; central spine solitary, brown at base and apex, 5 to 6 mm. long; flowers pinkish, the segments linear-oblong; fruit oblong, red. "Biznaga de chilillos" (*Patoni*).

7. **Neomammillaria hemisphaerica** (Engelm.) Britt. & Rose, Cactaceae 4: 75. 1923.
   Mammillaria hemisphaerica Engelm. in Wisliz. Mem. North. Mex. 105. 1848.
   Northeastern Mexico; type from Matamoros, Tamaulipas. Western Texas.

   Deep-seated in the soil, hemispheric, 8 to 12 cm. broad, dark green; tubercles only slightly angled, not very closely set, 1 to 1.5 cm. long, somewhat pointed, their axils nearly naked in the dormant stages; spine areoles woolly when young, becoming glabrate in age; radial spines 9 to 12, widely spreading, acicular, the upper ones more delicate, 4 to 8 mm. long, brownish or smoky, often with black tips; central spine solitary, porrect, brown; flowers cream-colored, 1 to 1.5 cm. long; inner perianth segments acute; fruit slender, clavate, red, 1 to 1.5 cm. long.

8. **Neomammillaria phymatothele** (Berg) Britt. & Rose, Cactaceae 4: 76. 1923.
   Mammillaria phymatothele Berg, Allg. Gartenz. 8: 129. 1840.
   Mammillaria ludwigii Ehrenb. Linnaea 14: 376. 1840.
   Central Mexico.

Simple, subglobose, glaucous-green; axils of young tubercles bearing white wool, becoming naked; tubercles large, 4-sided; areoles when young white-woolly, in age naked; radial spines 7 to 10, grayish white, the three upper smaller, the central recurved; flowers described by Schumann as carmine-colored.

9. **Neomammillaria magnimamma** (Haw.) Britt. & Rose, Cactaceae **4**: 77. 1923.

Mammillaria magnimamma Haw. Phil. Mag. **63**: 41. 1824.
Mammillaria divergens DC. Mém. Mus. Hist. Nat **17**: 113. 1828.
Mammillaria gladiata Mart. Nov. Act. Nat. Cur. **16**: 336. 1832.
Mammillaria ceratophora Lehm. Allg. Gartenz. **3**: 228. 1835.
Mammillaria recurva Lehm.; Pfeiff. Enum. Cact. 15. 1837.
Mammillaria hystrix Mart.; Pfeiff. Enum. Cact. 21. 1837.
Mammillaria ehrenbergii Pfeiff. Allg. Gartenz. **6**: 274. 1838.
Mammillaria microceras Lem. Cact. Aliq. Nov. 6. 1838.
Mammillaria deflexispina Lem. Cact. Aliq. Nov. 6. 1838.
Mammillaria versicolor Scheidw. Bull. Acad. Brux. **5**: 494. 1838.
?*Mammillaria conopsea* Scheidw. Bull. Acad. Brux. **5**: 496. 1838.
Mammillaria centricirrha Lem. Cact. Gen. Nov. Sp. 42. 1839.
Mammillaria neumanniana Lem. Cact. Gen. Nov. Sp. 53. 1839.
Mammillaria pentacantha Pfeiff. Allg. Gartenz. **8**: 406. 1840.
Mammillaria subcurvata Dietr. Allg. Gartenz. **12**: 232. 1844.
Mammillaria diadema Mühlenpf. Allg. Gartenz. **13**: 346. 1845.
Mammillaria krameri Mühlenpf. Allg. Gartenz. **13**: 347. 1845.
Mammillaria foersteri Mühlenpf. Allg. Gartenz. **14**: 371. 1846.
?*Mammillaria tetracentra* Otto; Först. Handb. Cact. 214. 1846.
Mammillaria bockii Först. Allg. Gartenz. **15**: 50. 1847.
Mammillaria pazzanii Stieber, Bot. Zeit. **5**: 491. 1847.
Mammillaria divaricata Dietr. Allg. Gartenz. **16**: 210. 1848.
Mammillaria hopferiana Linke, Allg. Gartenz. **16**: 329. 1848.
Mammillaria glauca Dietr.; Linke, Allg. Gartenz. **16**: 330. 1848.
Mammillaria megacantha Salm-Dyck, Cact. Hort. Dyck. 1849. 123. 1850.
Mammillaria uberimamma Monville; Labour. Monogr. Cact. 120. 1853.
?*Mammillaria cirrosa* Poselger, Allg. Gartenz. **21**: 94. 1853.
Mammillaria pachytele Poselger, Allg. Gartenz. **23**: 17. 1855.
Mammillaria lactescens Meinsh. Wochenschr. Gärtn. Pflanz. **2**: 117. 1859.
Mammillaria geberweileriana Haage; Först. Handb. Cact. ed. 2. 358. 1885.
Mammillaria schmidtii Sencke; Först. Handb. Cact. ed. 2. 376. 1885.

Valley of Mexico, and elsewhere in central Mexico.

Globose, the larger plants 10 cm. in diameter, sometimes solitary but oftener cespitose with 25 in a cluster or more, very milky throughout; tubercles conic or somewhat flattened or faintly 4-angled, 1 cm. long, the axils when young densely woolly; spines 3 to 5, very unequal, the upper ones short and straight, the lower one or two 1.5 to 2.5 cm. long, recurved or incurved, all horn-colored, with black tips; flowers cream-colored; fruit clavate, 2 cm. long, crimson; seeds brownish.

10. **Neomammillaria macracantha** (DC.) Britt. & Rose, Cactaceae **4**: 79. 1923.

Mammillaria macracantha DC. Mém. Mus. Hist. Nat. **17**: 113. 1828.
Cactus alternatus Coulter, Contr. U. S. Nat. Herb. **3**: 95. 1894.

San Luis Potosí.

Depressed-globose, 2 to 3 cm. high, 6 to 15 cm. in diameter; axils of old tubercles naked, of young ones densely lanate; tubercles ovoid, somewhat 4-sided; young spine areoles somewhat tomentose; spines 1 or 2, somewhat angled, elongate, the longest 5 cm. long, porrect or more or less reflexed, white or yellowish; flowers dark pink, a little longer than the tubercles; perianth segments linear, spreading.

11. Neomammillaria johnstonii Britt. & Rose, Cactaceae **4**: 80. 1923.

Type from San Carlos Bay, Sonora.

Plants large for the genus, globular to short-oblong, 15 to 20 cm. high, slightly depressed at apex; tubercles 1 to 1.3 cm. long, 4-angled throughout, somewhat bluish, naked in the axils, milky; spine areoles when young short-floccose, in age glabrate, terete; radial spines 10 to 14, white but with brown tips, somewhat spreading, stiff-acicular; central spines 2, much longer and stouter than the radials, slightly diverging, bluish brown; flowers from near the top of the plant but from the axils of old tubercles, campanulate, 2 cm. long; outer perianth segments ovate-lanceolate, greenish white with a reddish brown midrib; inner perianth segments narrow, acuminate, white.

12. Neomammillaria melanocentra (Poselg.) Britt. & Rose, Cactaceae **4**: 81. 1923.

Mammillaria melanocentra Poselg. Allg. Gartenz. **23**: 17. 1855.

Mammillaria erinacea Poselger, Allg. Gartenz. **23**: 18. 1855.

Mammillaria valida Weber, Dict. Hort. Bois 806. 1898.

Mexico; type from Monterrey, Nuevo León.

Short-cylindric, glaucous-green; tubercles in 8 and 13 spirals, strongly angled; radial spines 6, stout-subulate, 1.5 to 2 cm. long, brownish; central spines solitary, black, 2 to 3 cm. long, greatly overtopping the stem; flowers pinkish red, the segments linear, acute.

13. Neomammillaria runyonii Britt. & Rose, Cactaceae **4**: 81. 1923.

Type from El Mirador, near Monterrey, Nuevo León.

Plants deep-seated, depressed; tubercles milky, elongate, 1.5 cm. long, strongly 4-angled, their tips widely separated, the axils long-woolly (never setose), especially when young, sometimes permanently so; young spine areoles long-woolly, in age glabrate; radial spines 6 to 8, slightly ascending, the outer ones stouter and often dark brown, the inner ones about half the length of the outer and nearly white; central spine solitary, brown to black, erect, 10 to 14 mm. long; flowers about 2 cm. long, purple; perianth segments oblong; fruit red, clavate, 12 to 16 mm. long; seeds brown.

14. Neomammillaria sartorii (Purpus) Britt. & Rose, Cactaceae **4**: 82. 1923.

Mammillaria sartorii Purpus, Monatsschr. Kakteenk. **21**: 50. 1911.

Veracruz, the type from Barranca de Pancaya.

Globose to short-cylindric, 5 to 13 cm. in diameter, cespitose, very milky, bluish green; tubercles strongly 4-angled, pointed, 8 to 12 mm. long, their axils without bristles and in time without wool; spine areoles circular when young, densely white-woolly but in age glabrate; spines 4 to 6, very unequal, 5 to 8 mm. long, whitish or sometimes brownish, the central spine solitary; flowers 1.5 to 2 cm. long, deep carmine; perianth segments oblong, apiculate, the tip dry, the outer ones ciliate, the inner serrulate; fruit carmine; seeds brown.

15. Neomammillaria seitziana (Mart.) Britt. & Rose, Cactaceae **4**: 83. 1923.

Mammillaria scitziana Mart.; Pfeiff. Enum. Cact. 18. 1837.

Mammillaria fovcolata Mühlenpf. Allg. Gartenz. **14**: 372. 1846.

Hidalgo, the type from Ixmiquilpan.

Solitary or somewhat proliferous at base, cylindric, 12 cm. high; tubercles green, conic, somewhat angled; axils of tubercles woolly; areoles at first white-woolly, becoming glabrate; spines 4, the upper and lower longer than the lateral; flower rose-colored, about 25 mm. long; outer perianth segments olive-colored, the inner linear-lanceolate, white, nerved with red.

16. Neomammillaria ortegae Britt. & Rose, Cactaceae 4: 83. 1923.

Sinaloa.

Simple, short-clavate, 5 to 8 cm. in diameter, light green, lactiferous; tubercles rather short (8 to 10 mm. long), broader at base, obscurely 4-angled, somewhat pointed, very woolly but not setose in the axils; spines all radial, 3 or 4, more commonly 4 (sometimes with 1 or 2 small additional spines or bristles, perhaps deciduous), spreading, straw-colored, 6 to 10 mm. long; flowers small; fruit clavate, 1 cm. long; seeds numerous, small, angled, brown.

17. Neomammillaria meiacantha (Engelm.) Britt. & Rose, Cactaceae 4: 83. 1923.

Mammillaria meiacantha Engelm. Proc. Amer. Acad. 3: 263. 1856.

Northern Mexico. Texas and New Mexico.

Somewhat depressed, 12 cm. broad or more; tubercles milky, bluish green, more or less angled, somewhat flattened dorsally, the axils naked; spines 5 to 9, ascending, pale flesh-colored, the tips darker, the lower a little stouter than the upper; central spines porrect, similar to but a little stouter than the radials and often subradial; spine areoles short-woolly at first; inner perianth segments white with a pink stripe along the inside of the midrib one-fourth its width, greenish brown outside; fruit scarlet, 22 mm. long; seeds brownish.

18. Neomammillaria scrippsiana Britt. & Rose, Cactaceae 4: 84. 1923.

Type from Guadalajara, Jalisco.

Globose or becoming short-cylindric, 6 cm. high; tubercles milky, in 26 rows, bluish green, very woolly in the axils when young; spine areoles very woolly at first; radial spines 8 to 10, slender, pale with reddish tips; central spines generally 2, a little longer than the radials, brown throughout, slightly divergent; flowers borne near the top of the plant but not in the axils of the youngest tubercles, about 1 cm. long, pinkish, with the margins of the perianth segments paler.

19. Neomammillaria gigantea (Hildm.) Britt. & Rose, Cactaceae 4: 85. 1923.

Mammillaria gigantea Hildm.; Schum. Gesamtb. Kakt. 578. 1898.

Guanajuato.

Solitary or cespitose, depressed-globose, 10 cm. high, 15 to 17 cm. in diameter; axils of tubercles lanate; radial spines 12, subulate, white, 3 mm. long; central spines 4 to 6, stout, 2 cm. long, curved, yellowish brown; flowers yellowish green.

20. Neomammillaria peninsularis Britt. & Rose, Cactaceae 4: 85. 1923.

Baja California; type from Cape San Lucas.

Plants solitary or in clusters, deeply seated in the ground, more or less flat-topped, bluish green, the stems and tubercles very milky; tubercles erect, pointed, 4-angled, pale green; radial spines 4 to 8, nearly erect, short and pale with brown tips, one sometimes nearly central; axils of tubercles bearing long wool but in age naked; flowers 1.5 cm. long, arising from old tubercles but near the center; outer perianth segments narrow, reddish, the inner narrow, acuminate, green or light yellow, with erose margins.

21. **Neomammillaria flavovirens** (Salm-Dyck) Britt. & Rose, Cactaceae **4**: 85. 1923.

Mammillaria flavovirens Salm-Dyck, Cact. Hort. Dyck. 1849. 117. 1850.

Mexico.

Either solitary or somewhat cespitose, globose or short-cylindric, 6 to 8 cm. high, light or yellowish green; tubercles somewhat 4-angled; axils naked; radial spines 5, slender, subulate; central spines solitary, porrect; flowers white, streaked with rose.

22. **Neomammillaria sempervivi** (DC.) Britt. & Rose, Cactaceae 4: 86. 1923.

Mammillaria sempervivi DC. Mém. Mus. Hist. Nat. **17**: 114. 1828.

Mammillaria caput-medusae Otto; Pfeiff. Enum. Cact. 22. 1837.

Mammillaria diacantha Lem. Cact. Aliq. Nov. 2. 1838.

Hidalgo and elsewhere in central Mexico.

Solitary or somewhat cespitose, flattened above, narrowed below; axils of tubercles very woolly, milky; tubercles short, angled; spine areoles very woolly when young but glabrate in age; radial spines 3 to 7, short, white, caducous; central spines 2, ascending, brownish, stoutish; flowers dull white, with reddish lines; inner perianth segments acute, spreading.

23. **Neomammillaria obscura** (Hildm.) Britt. & Rose, Cactaceae **4**: 87. 1923.

Mammillaria obscura Hildm. Monatsschr. Kakteenk. **1**: 52. 1891.

Mexico, the range not known.

Solitary, depressed-globose, blackish green; axils woolly; tubercles arranged in 13 and 21 spirals, angled, stout, woolly in the axils but not setose; radial spines 6 to 8, subulate, white, unequal, the upper ones shorter than the lower; central spines 2 to 4, the lower one slightly curved, black; flowers small.

24. **Neomammillaria crocidata** (Lem.) Britt. & Rose, Cactaceae **4**: 87. 1923.

Mammillaria crocidata Lem. Cact. Aliq. Nov. 9. 1838.

Mammillaria webbiana Lem. Cact. Hort. Monv. 45. 1839.

Querétaro and elsewhere in central Mexico.

Plant globose or a little depressed, 5 to 6 cm. in diameter; radial spines 6 or 7, dark brown or nearly black; central spines none; axils of tubercles in young plant densely woolly; flowers from axils of old tubercles near top of plant, reddish purple, 12 to 14 cm. long; outer perianth segments ciliate, the inner acuminate.

25. **Neomammillaria polythele** (Mart.) Britt. & Rose, Cactaceae **4**: 88. 1923.

Mammillaria polythele Mart. Nov. Act. Nat. Cur. **16**: 328. 1832.

Mammillaria quadrispina Mart. Nov. Act. Nat. Cur. **16**: 329. 1832.

Mammillaria columnaris Mart. Nov. Act. Nat. Cur. **16**: 330. 1832.

Mammillaria affinis DC. Mém. Cact. 11. 1834.

Mammillaria setosa Pfeiff. Allg. Gartenz. **3**: 379. 1835.

?*Mammillaria hidalgensis* Purpus, Monatsschr. Kakteenk. **17**: 118. 1907.

Hidalgo.

Elongate, cylindric, often 30 to 50 cm. high, 7 to 10 cm. in diameter; tubercles milky, in about 21 spirals, 10 to 12 mm. long, nearly terete, somewhat narrowed toward apex, dull green; axils of young tubercles densely long-woolly and often nearly covering the top of plant, in age becoming naked; spines 2 to 4, perhaps sometimes 6, all radial, somewhat spreading, 1 to 2.5 cm. long, reddish, straight or a little curved; flowers from near the top of the plant, reddish, 8 to 10 mm. long; perianth segments narrow, acuminate; fruit red, clavate; seeds small, brownish.

26. Neomammillaria carnea (Zucc.) Britt. & Rose, Cactaceae 4: 88. 1923.
Mammillaria carnea Zucc.; Pfeiff. Enum. Cact. 19. 1837.
Mammillaria subtetragona Dietr. Allg. Gartenz. 8: 169. 1840.
Mammillaria aeruginosa Scheidw. Allg. Gartenz. 8: 338. 1840.
Mammillaria pallescens Scheidw. Allg. Gartenz. 9: 42. 1841.
Central and southern Mexico, the type from Ixmiquilpan, Hidalgo.

Plants solitary, cylindric, 8 to 9 cm. high; tubercles strongly 4-angled, the axils woolly, the upper ones erect; radial spines none; central spines 4, straight, reddish, the lower one 10 mm. long, twice as long as the other 3; flowers borne in the old axils; outer perianth segments nearly 2 cm. long, nearly erect, flesh-colored; fruit pear-shaped, obtuse, bright red.

27. Neomammillaria lloydii Britt. & Rose, Cactaceae 4: 89. 1923.
Zacatecas.

Plant body at first flattened but in cultivation becoming elongate, sometimes 10 cm. long, 6 to 7 cm. in diameter; axils of young tubercles only slightly woolly; tubercles milky, small, numerous, 4-angled, woolly when quite young; radial spines 3 or 4, ascending, glabrous, the uppermost one red or dark brown, the others whitish, 2 to 5 mm. long; central spines none; flowers in a ring near the center of plant; outer perianth segments dark red with light or colored margins, the inner white with a tinge of red and dark red central stripes, not ciliate, apiculate, spreading above.

28. Neomammillaria zuccariniana (Mart.) Britt. & Rose, Cactaceae 4: 89. 1923.
Mammillaria zuccariniana Mart. Nov. Act. Nat. Cur. 16: 331. 1832.
San Luis Potosí.

Globose to elongate-cylindric, 8 to 20 cm. long, bluish green, milky; areoles and axils of young tubercles filled with white wool; radial spines wanting or represented by very stout bristles; central spines 2 to 4, black, unequal, 2 to 12 mm. long, spreading; flowers about 1 cm. long, with a broad open throat; outer perianth segments brownish, acute, the inner lanceolate, acute, entire, magenta; fruit red, 10 mm. long; seeds brownish.

29. Neomammillaria formosa (Galeotti) Britt. & Rose, Cactaceae 4: 99. 1923.
Mammillaria formosa Galeotti; Scheidw. Bull. Acad. Brux. 5: 497. 1838.
San Luis Potosí; type from San Felipe.

Somewhat clavate, sunken at apex; axils lanate; tubercles spirally arranged, obtusely 4-angled, light green; areoles naked; radial spines 20 to 22, white, rigid, radiating; central spines 6, spreading, thickened at base, at first flesh-colored at base, black at tip, becoming black throughout or grayish; flowers red.

30. Neomammillaria compressa (DC.) Britt. & Rose, Cactaceae 4: 90. 1923.
Mammillaria compressa DC. Mém. Mus. Hist. Nat. 17: 112. 1828.
Mammillaria subangularis DC. Mém. Mus. Hist. Nat. 17: 112. 1828.
Mammillaria triacantha DC. Mém. Mus. Hist. Nat. 17: 113. 1828.
Mammillaria cirrhifera Mart. Nov. Act. Nat. Cur. 16: 334. 1832.
Mammillaria angularis Link & Otto; Pfeiff. Enum. Cact. 12. 1837.
Mammillaria squarrosa Meinsh. Wochenschr. Gärtn. Pflanz. 2: 116. 1850.
Mammillaria oettingenii Zeissold, Monatsschr. Kakteenk. 8: 10. 1898.
Mammillaria kleinschmidtiana Zeissold, Monatsschr. Kakteenk. 8: 21. 1898.
Querétaro, San Luis Potosí, and elsewhere in central Mexico.

Growing in large clumps, cylindric, pale bluish green; axils of tubercles white-woolly, setose; tubercles short, compressed laterally, keeled below, more rounded above; young spine areoles white-woolly; principal spines 4, some-

times with 1 to 3 very short accessory ones from the lower part of the areole; lower spine much longer, spreading or recurved, 5 to 6 cm. long, somewhat angled; all spines pale, more or less tinged with brown, with dark tips; flower pinkish, 10 to 12 mm. long; outer perianth segments acute, somewhat ciliate, the inner narrow, acuminate, with spreading tips; fruit clavate, red; seeds brown.

31. Neomammillaria mystax (Mart.) Britt. & Rose, Cactaceae 4: 92. 1923.

Mammillaria mystax Mart. Nov. Act. Nat. Cur. 16: 332. 1832.
Mammillaria leucotricha Scheidw. Allg. Gartenz. 8: 338. 1840.
Mammillaria zanthotricha Scheidw. Allg. Gartenz. 8: 338. 1840.
Mammillaria mutabilis Scheidw. Allg. Gartenz. 9: 43. 1841.
Mammillaria funkii Scheidw. Allg. Gartenz. 9: 43. 1841.
Mammillaria autumnalis Dietr. Allg. Gartenz. 16: 297. 1848.
Mammillaria maschalacantha Monville; Labour. Monogr. Cact. 106. 1853.

Mountains of Puebla and Oaxaca, and perhaps elsewhere in southern Mexico.

Globose to short-cylindric, 7 to 15 cm. high, flat-topped; tubercles in as many as 34 rows, thickly set, milky; radial spines 8 to 10, small, white; central spines 4, 3 about twice as long as the radial ones, the other much elongate, 6 to 7 cm. long; flowers 1.5 to 2 cm. long, appearing in 2 or 3 rows, very abundant; inner perianth segments dark red, 12 mm. long; fruit red, 2 to 2.5 cm. long.

32. Neomammillaria petterssonii (Hildm.) Britt. & Rose, Cactaceae 4: 94. 1923.

Mammillaria petterssonii Hildm. Deutsch. Gartenz. 1886: 185. 1886.
Mammillaria heeseana McDowell, Monatsschr. Kakteenk. 6: 125. 1896.

Guanajuato.

Plants rather large for the genus, cylindric, 20 cm. high or more, very spiny; tubercles arranged in 13 or 21 spirals, terete, setose in their axils; radial spines 10 to 12, white, with black tips; central spines 4, the longest ones 4.5 cm. long; fruit small, naked, oblong.

33. Neomammillaria karwinskiana (Mart.) Britt. & Rose, Cactaceae 4: 95. 1923.

Mammillaria karwinskiana Mart. Nov. Act. Nat. Cur. 16: 335. 1832.
?*Mammillaria fischeri* Pfeiff. Allg. Gartenz. 4: 257. 1836.
Mammillaria centrispina Pfeiff. Allg. Gartenz. 4: 258. 1836.
?*Mammillaria virens* Scheidw. Allg. Gartenz. 9: 43. 1841.

Oaxaca.

Globose to cylindric, somewhat flattened above; tubercles terete, milky; spines 4 to 6, all radial, sometimes one more near the center than the others, nearly equal, short, brown or blackish at the tips or throughout; axils very woolly and with long, conspicuous, white or brown-tipped bristles much longer than the tubercles; flowers nearly 2 cm. long, the scales and outer perianth segments narrow, reddish except at the margins, ciliate; inner perianth segments broader, cream-colored, not ciliate, mucronate-tipped; fruit 15 mm. long, red; seeds brown.

Related to this species is *Mammillaria knippeliana* Quehl (Monatsschr. Kakteenk. 17: 59. 1907). It was described from cultivated plants.

34. Neomammillaria standleyi Britt. & Rose, Cactaceae 4: 97. 1923.

Sonora; type from Sierra de Alamos.

Plants usually solitary, nearly globose, often 10 cm. in diameter, pale green, densely covered with spines; axils of tubercles containing white bristles, the flowering and fruiting ones filled with dense white wool; radial spines about

16, slightly spreading, white except the dark tips; central spines 4, longer and stouter than the radials, porrect, reddish brown; flowers about 12 mm. long, purplish; inner perianth segments oblong, entire; fruit scarlet, 12 to 16 mm. long; seeds brownish.

35. **Neomammillaria evermanniana** Britt. & Rose, Cactaceae 4: 97. 1923.
Type from Cerralbo Island, Baja California.

Globose to elongate-turbinate, 5 to 7 cm. in diameter, lactiferous; tubercles closely set, terete, nearly hidden under the numerous slender spines; axils of tubercles at first very woolly and setose; spines white except at tip, there brown; radial spines 12 to 15; central spines 3, erect or nearly so; fruit red, about 1 cm. long; seeds brown.

36. **Neomammillaria parkinsonii** (Ehrenb.) Britt. & Rose, Cactaceae 4: 98. 1923.
Mammillaria parkinsonii Ehrenb. Linnaea 14: 375. 1840.
Central Mexico; type from San Onofre in the Mineral del Doctor.

Cespitose, somewhat depressed to cylindric, 15 cm. high, 7.5 cm. in diameter, globose, glaucous-green; axils of tubercles lanate and setose; tubercles milky, short, conic; radial spines numerous, setaceous, short, white; central spines 2 or sometimes 4 or 5, brownish at tip; flowers surrounded by a mass of wool, small, yellowish; inner perianth segments apiculate; fruit clavate, scarlet, 1 cm. long; seeds brown.

37. **Neomammillaria geminispina** (Haw.) Britt. & Rose, Cactaceae 4: 98. 1923.
Mammillaria geminispina Haw. Phil. Mag. 63: 42. 1824.
Mammillaria bicolor Lehm. Sam. Cact. Hamb. Gart. 7. 1830.
Mammillaria nivea Wendl.; Pfeiff. Enum. Cact. 27. 1837.
Mammillaria daedala Scheidw. Hort. Belg. 4: 16. 1837.
Mammillaria toaldoae Lehm. Linnaea 12: 13. 1838
Mammillaria eburnea Miquel, Linnaea 12: 14. 1838.
Mammillaria nobilis Pfeiff. Allg. Gartenz. 8: 282. 1840.
North-central Mexico.

Cespitose or single in cultivation, cylindric, somewhat glaucous; axils woolly; tubercles terete, conic; radial spines 16 to 20, very short, setaceous, white; central spines 2 to 4, stouter and longer than the radials, about 25 mm. long, black-tipped; flowers dark red; inner perianth segments oblong, obtuse, serrate.

38. **Neomammillaria pyrrhocephala** (Scheidw.) Britt. & Rose, Cactaceae 4: 99. 1923.
Mammillaria pyrrhocephala Scheidw. Allg. Gartenz. 9: 42. 1841.
Mammillaria senkei Först. Handb. Cact. 227. 1846.
Hidalgo and perhaps Oaxaca; type from Real del Monte, Hidalgo.

Cylindric; axils lanate and setose; tubercles angled, green or subglaucous; areole bearing yellowish wool; spines all black when young, when old becoming gray below; radial spines 6, spreading, the upper ones a little longer; central spines single, erect; flowers red.

39. **Neomammillaria collinsii** Britt. & Rose, Cactaceae 4: 101. 1923.
Type from San Gerónimo, Oaxaca.

Plants forming large clumps, the individuals globose, 4 cm. in diameter; tubercles terete, green but becoming bronzed or even deep purple; axils of tubercles both lanate and setose; radial spines usually 7, pale yellowish below, with dark brown or blackish tips, subequal, 5 to 7 mm. long; central

spine 1, similar to or a little longer and usually darker than the radials; flowers 12 to 15 mm. long; outer perianth segments reddish with yellowish margin, ciliate; inner perianth segments lighter, entire, acuminate; fruit clavate, 15 cm. long, deep red; seeds brownish.

40. **Neomammillaria chinocephala** (Purpus) Britt. & Rose, Cactaceae 4: 101. 1923.

Mammillaria chinocephala Purpus, Monatsschr. Kakteenk. 16: 41. 1906.

Highlands of central Mexico; type from Sierra de Parras, Coahuila.

Plants globose, sometimes 8 cm. in diameter, almost hidden by the white spines; tubercles low, very milky; axils of tubercles densely filled with white wool and numerous hairlike bristles; radial spines 35 to 40, somewhat pectinate, spreading; central spines 2 to 7, more or less divergent, much stouter than the radials, rigid, white, with brownish tips; flowers 1 cm. long, rose-red; fruit clavate, red; seeds small, brown.

41. **Neomammillaria tenampensis** Britt. & Rose, Cactaceae 4: 101. 1923.

Type from Barranca de Tenampa.

Globose, light green, 5 to 6 cm. in diameter; tubercles 6 to 7 mm. long, 4-sided, pointed; axils of upper tubercles naked, but those producing flowers filled with yellow wool and numerous yellow bristles; spines 4 to 6, brownish with dark tips, ascending, surrounded at base by 8 to 10 small white bristles; outermost perianth segments small, brownish, the outer ones lanceolate, acuminate, similar to the inner ones, all ciliate; inner perianth segments reddish purple, 8 to 10 mm. long, lanceolate, apiculate, denticulate.

42. **Neomammillaria polygona** (Salm-Dyck) Britt. & Rose, Cactaceae 4: 101. 1923.

Mammillaria polygona Salm-Dyck, Cact. Hort. Dyck. 1849. 120. 1850.

Mexico, the range not known.

Subclavate, 10 cm. high, simple; axils of tubercles lanate and setose; tubercles 4-angled; radial spines about 8, 2 or 3 upper ones minute, the 4 lateral ones and the lowermost one longer; central spines 2, stout, brownish at tip, often long and recurved; flowers pale rose-colored.

Related to this species is *Mammillaria echinops* Scheidw. (Hort. Belg. 5: 95. 1838), which was described from Mexico.

43. **Neomammillaria confusa** Britt. & Rose, Cactaceae 4: 102. 1923.

Mexico, but range not known.

At first solitary, becoming cespitose, globose to short-cylindric, deep green; axils densely white-woolly and setose; tubercles short, a little flattened, 4-angled, pointed; spines 4 to 6, all radial, ascending, at first yellowish with brown tips, in age white below, 2 to 3 mm. long; flowers yellow, about 8 mm. long; outer perianth segments ovate, ciliate, with a black mucro-tip; inner perianth segments spreading, acute.

44. **Neomammillaria villifera** (Otto) Britt. & Rose, Cactaceae 4: 102. 1923.

Mammillaria villifera Otto; Pfeiff. Enum. Cact. 18. 1837.

Mexico, but range not known.

Subglobose, proliferous; axils lanate and setose; tubercles angled; areoles at first lanate, in age naked; spines 4, rigid, straight, the lowest one longer (8 mm. long), at first purplish, in age black; flowers pale rose-colored; inner perianth segments 14, acute.

45. **Neomammillaria polyedra** (Mart.) Britt. & Rose, Cactaceae 4: 102. 1923.

Mammillaria polyedra Mart. Nov. Act. Nat. Cur. 16: 326. 1832.

Mammillaria polytricha Salm-Dyck, Allg. Gartenz. 10: 289. 1842.

Southern Mexico; type from Oaxaca.

Simple, cylindric or somewhat broader above; axils of tubercles setose; tubercles 12 mm. long, flattened dorsally, angled, pointed; spines 4, ascending, short, grayish with purplish tips; flowers inconspicuous, reddish; inner perianth segments short-acuminate.

46. **Neomammillaria conzattii** Britt. & Rose, Cactaceae 4: 103. 1923.

Type from Cerro San Felipe, Oaxaca.

Short-cylindric, 8 cm. high, sometimes branched at apex, dark green, very milky; axils of young tubercles bearing an abundance of white wool and conspicuous white bristles; tubercles 4 to 5 mm. long, somewhat angled; young spine areoles woolly; spines 4 or 5, all radial, somewhat spreading, brownish, the tips usually darker than the bases; flowers white, campanulate, sometimes tinged with red, about 2 cm. long, the segments somewhat spreading, narrowly oblong, the outer ones serrulate, apiculate.

47. **Neomammillaria napina** (Purpus) Britt. & Rose, Cactaceae 4: 104. 1923.

Mammillaria napina Purpus, Monatsschr. Kakteenk. **22**: 161. 1912.

Southern Mexico; type from mountains west of Tehuacán, Puebla.

Roots thick, elongate when small, single, but when in a cluster of 3 or 4, somewhat spindle-shaped; plants globose, 4 to 6 cm. in diameter; tubercles low, terete in section, not at all milky; spines all radial, 10 to 12, pectinate, white or yellowish, spreading and interlacing.

48. **Neomammillaria lanata** Britt. & Rose, Cactaceae 4: 104. 1923.

Type from Río de Santa Luisa.

Small, short-cylindric; tubercles 2 to 4 mm. long; spine areoles short-elliptic; spines 12 to 14, all radial, widely spreading, white except the brown bases; flowering areoles very woolly, the young flowers surrounded by a mass of long white hairs; flowers 6 to 7 mm. long, red; inner perianth segments about 15, oblong, obtuse or acutish, spreading above.

49. **Neomammillaria kewensis** (Salm-Dyck) Britt. & Rose, Cactaceae 4: 104. 1923.

Mammillaria kewensis Salm-Dyck, Cact. Hort. Dyck. 1849. 112. 1850.

Mexico, but range not known.

Globose to cylindric, 3 to 4 cm. in diameter; tubercles short, terete, when young short-woolly in the axils and at the areoles; spines 5 or 6, all radial, 4 to 5 mm. long, brown with dark tips; axils of tubercles bearing crisp hairs; flowers about 15 mm. long, reddish purple; perianth segments lanceolate, acute.

50. **Neomammillaria subpolyedra** (Salm-Dyck) Britt. & Rose, Cactaceae 4: 105. 1923.

Mammillaria subpolyedra Salm-Dyck, Hort. Dyck. 343. 1834.

Hidalgo.

Solitary, subcylindric, 10 cm. high, 6 cm. in diameter; tubercles pointed, strongly angled; axils and spine areoles white-woolly; spines 4, at first blackish purple, becoming paler but the tips remaining purplish, the lowest one largest; flowers 2.5 cm. broad; perianth segments obtuse, erose, with darker midrib; fruit red, 2.5 cm. long, pyriform, 12 mm. in diameter at apex.

51. **Neomammillaria galeottii** (Scheidw.) Britt. & Rose, Cactaceae 4: 105. 1923.

Mammillaria galeottii Scheidw. Hort. Belg. 4: 93. 1837.

Mexico, the range not known.

Simple or cespitose, the joints globose; tubercles pointed; spines 4, elongate, the upper ones erect and connivent over the apex of the plant, on the older tubercles weak and spreading, 2.5 cm. long.

52. **Neomammillaria tetracantha** (Salm-Dyck) Britt. & Rose, Cactaceae 4: 106. 1923.

Mammillaria tetracantha Salm-Dyck; Pfeiff. Enum. Cact. 18. 1837.
Mammillaria obconella Scheidw. Hort. Belg. 4: 93. 1837.
Mammillaria dolichocentra Lem. Cact. Aliq. Nov. 3. 1838.
Mammillaria rigidispina Hildmann, Monatsschr. Kakteenk. 3: 112. 1893.
Mexico, the range not known.

Nearly globose, 6 to 8 cm. in diameter; axils of tubercles with scant persistent wool; tubercles 8 to 10 mm. long, obscurely 4-angled; areoles small, at first lanate, somewhat 4-angled; spines 4, all radial, slender, the 3 lower equal, the upper one incurved, longer, 25 mm. long, when young all yellowish white, in age grayish yellow or brown; flowers numerous from near the top of the plant, small, pinkish to rose-colored; inner perianth segments narrowly lanceolate, acuminate.

53. **Neomammillaria elegans** (DC.) Britt. & Rose, Cactaceae 4: 107. 1923.

Mammillaria geminispina DC. Mém. Mus. Hist. Nat. 17: 30. 1828. Not *M. geminispina* Haw. 1824.
Mammillaria elegans DC. Mém. Mus. Hist. Nat. 17: 11. 1828.
Mammillaria acanthophlegma Lehm. Delect. Sem. Hort. Hamb. 1832.
Mammillaria supertexta Mart.; Pfeiff. Enum. Cact. 25. 1837.
Mammillaria dyckiana Zucc.; Pfeiff. Enum. Cact. 26. 1837.
Mammillaria klugii Ehrenb. Bot. Zeit. 2: 834. 1844.
Mammillaria meisneri Ehrenb. Bot. Zeit. 2: 834. 1844.
Mammillaria kunthii Ehrenb. Bot. Zeit. 2: 835. 1844.
Mammillaria splendens Ehrenb. Allg. Gartenz. 17: 242. 1849.
Central Mexico.

Simple, obovate to globose, 5 cm. in diameter, somewhat umbilicate at apex; tubercles ovate, naked in their axils, not lactiferous; spine areoles tomentose when young; radial spines stiff, bristle-like, 25 to 30, white, spreading; central spine 1 (sometimes 2 or 3), rigid.

Related to this species are *Mammillaria conspicua* Purpus (Monatsschr. Kakteenk. 22: 163. 1912) and *M. microthele* Mühlenpf. (Allg. Gartenz. 16: 11. 1848; *Cactus bispinus* Coulter, Contr. U. S. Nat. Herb. 3: 101. 1894).

54. **Neomammillaria pseudoperbella** (Quehl) Britt. & Rose, Cactaceae 4: 109. 1923.

Mammillaria pseudoperbella Quehl, Monatsschr. Kakteenk. 19: 188. 1909.
Oaxaca and elsewhere.

Simple or with few branches, globose to short-cylindric, very spiny, depressed at apex; tubercles short-cylindric; radial spines 20 to 30, setaceous, white, short; central spines 2, one erect, the other turned backward.

55. **Neomammillaria dealbata** (Dietr.) Britt. & Rose, Cactaceae 4: 110. 1923.

Mammillaria dealbata Dietr. Allg. Gartenz. 14: 309. 1845.
Valley of Mexico and elsewhere in Central Mexico.

Globose, to short-cylindric, glaucous, more or less depressed at apex but almost hidden by the many closely appressed spine clusters; axils of tubercles and young spine areoles densely lanate but in age glabrate; radial spines about 20, white, short, appressed; central spines 2, much stouter and longer than the radials, sometimes 1 cm. long, the upper ones often erect, white below, brown or black at tip; flowers small, carmine; fruit clavate, red; seeds brown.

56. **Neomammillaria haageana** (Pfeiff.) Britt. & Rose, Cactaceae 4: 110. 1923
Mammillaria haageana Pfeiff. Allg. Gartenz. 4: 257. 1836.
Mexico, the range not known.

Somewhat cespitose, the individual plants globose or somewhat elongate in age; axils slightly woolly; radial spines about 20, radiating, white, central spines 2, a little longer than the radials, black; flowers small, carmine-rose.

57. **Neomammillaria perbella** (Hildm.) Britt. & Rose, Cactaceae 4: 111. 1923.
Mammillaria perbella Hildm.; Schum. Gesamtb. Kakt. 567. 1898.
Mexico, the range not known.

Solitary or somewhat cespitose, depressed-globose, glaucous-green; tubercles short-conic, their axils lanate; radial spines 14 to 18, 1 to 1.5 mm. long, setaceous, white; central spines 2, very short (4 to 6 mm. long); flowers 9 to 10 mm. long, reddish.

58. **Neomammillaria collina** (Purpus) Britt. & Rose, Cactaceae 4: 111. 1923.
Mammillaria collina Purpus, Monatsschr. Kakteenk. 22: 162. 1912.
Puebla, the type from Esperanza.

Simple, globose, 12 to 13 cm. in diameter, somewhat depressed at apex; tubercles cylindric, 1 cm. long or less, woolly in their axils; radial spines 16 to 18, white, 4 mm. long; central spines 1 to 2, longer than the radials; flowers rose-colored, 1.5 to 2 cm. long; fruit 2 cm. long, red.

59. **Neomammillaria donatii** (Berge) Britt. & Rose, Cactaceae 4: 111. 1923.
Mammillaria donatii Berge; Schum. Gesamtb. Kakt. Nachtr. 135. 1903.
Mexico, the range not known.

Usually simple, stout and globose but sometimes branching, glaucous-green; tubercles small, conic, naked in their axils; radial spines 16 to 18, 8 mm. long, glossy; central spines 2, yellowish black, 10 mm. long; flowers reddish, 15 mm. long.

60. **Neomammillaria mundtii** (Schum.) Britt. & Rose, Cactaceae 4: 112. 1923.
Mammillaria mundtii Schum. Monatsschr. Kakteenk. 13: 141. 1903.
Mexico, the range not known.

Solitary, so far as known, globose, 6 to 7 cm. in diameter; tubercles not milky, nearly terete, dark green, rather short and stubby, naked in their axils; spine areoles circular, somewhat lanate when young; radial spines 8 to 19, swollen at base, spreading or somewhat curved backward, 6 to 8 mm. long, brownish when young, the tips usually darker; central spines 2, a little stouter and longer than the radials, porrect; flower from near the center of the plant, 2 cm. long.

61. **Neomammillaria celsiana** (Lem.) Britt. & Rose, Cactaceae 4: 112. 1923.
Mammillaria celsiana Lem. Cact. Hort. Monv. 41. 1839.
Mammillaria muehlenpfordtii Först. Allg. Gartenz. 15: 49. 1847.
Mammillaria schaeferi Fennel, Allg. Gartenz. 15: 66. 1847.
?*Mammillaria perringii* Hildmann, Gartenwelt 10: 250. 1906.
Oaxaca and elsewhere in southern Mexico.

Plant body subglobose, becoming columnar, 10 to 12.5 cm. high, 7.5 cm. in diameter, deep green; axils of tubercles woolly; tubercles conic, compact; spine areoles small, round, woolly when young; radial spines 24 to 26, about equal, white, setaceous; central spines 4 to 6, rarely 7, somewhat longer than the radials, terete, rigid, pale yellow, more or less recurved and unequal, 8 to 16 mm. long; flowers red; fruit described as green.

62. Neomammillaria aureiceps (Lem.) Britt. & Rose, Cactaceae 4: 114. 1923.
Mammillaria aureiceps Lem. Cact. Aliq. Nov. 8. 1838.
Valley of Mexico.
Globose to short-oblong, 8 to 10 cm. in diameter; tubercles short, terete, woolly and setose in their axils; radial spines about 20, bristle-like, white, 5 to 8 mm. long, spreading; central spines several, sometimes as many as 9, yellow, stouter and longer than the radials, 10 to 14 mm. long, somewhat spreading and a little curved inward; flowers small, dark red.

63. Neomammillaria yucatanensis Britt. & Rose, Cactaceae 4: 114. 1923.
Yucatán; type from Progreso.
Plants in clumps of 4, erect, cylindric, not milky, 10 to 15 cm. long, 3 to 6 cm. in diameter, very spiny; tubercles conic, woolly in their axils but not setose; radial spines about 20, white, spreading, acicular; central spines 4 or rarely 5, much stouter than the radials, 6 to 8 mm. long, slghtly spreading above, yellowish brown; flowers very small, rose; fruit oblong, bright red.

64. Neomammillaria pringlei (Coulter) Britt. & Rose, Cactaceae 4: 115. 1923.
Cactus pringlei Coulter, Contr. U. S. Nat. Herb. 3: 109. 1894.
Mammillaria pringlei K. Brandeg. Zoe 5: 7. 1900.
State of Mexico; type from Tultenango Canyon.
Solitary, with long fibrous roots, usually globose but sometimes depressed or short-cylindric, 6 to 16 cm. high, 6 to 7 cm. in diameter; tubercles dull green, terete, conic, 6 to 10 mm. long; axils of tubercles woolly and setose; spines all yellow; radial spines 18 to 20, setaceous, spreading, 5 to 8 mm. long; central spines 5 to 7, much stouter and longer than the radials, more or less recurved, 2 to 2.5 cm. long, those from the upper areoles curved over the apex of the plant; flowers deep red, 8 to 10 mm. long; fruits borne in a circle near the middle of the plant, oblong, 12 to 15 mm. long; seeds small, brown.

65. Neomammillaria cerralboa Britt. & Rose, Cactaceae 4: 116. 1923.
Type from Cerralbo Island, Baja California.
Cylindric, solitary, 10 to 15 cm. high, 5 to 6 cm. in diameter; tubercles not milky, yellowish, terete, obtuse, closely set; spines all yellow, very much alike, about 11, one usually more central, the longer ones nearly 2 cm. long; flowers 1 cm. long or less.

66. Neomammillaria phaeacantha (Lem.) Britt. & Rose, Cactaceae 4: 116. 1923.
Mammillaria phaeacantha Lem. Cact. Hort. Monv. 47. 1839.
Mammillaria nigricans Fennel, Allg. Gartenz. 15: 66. 1847.
Mexico, the range not known.
Globose or somewhat depressed, green; axils of tubercles woolly; tubercles conic, hardly if at all angled; spine areoles small, yellowish-tomentose (probably so only when young); radial spines 16 to 20, white, setaceous; central spines 4, black, subulate, spreading or reflexed, the lowest one longest; flowers from the upper part of the plant, dark red; perianth segments oblong, acuminate.

67. Neomammillaria graessneriana (Bödeker) Britt. & Rose, Cactaceae 4: 117. 1923.
Mammillaria graessneriana Bödeker, Monatsschr. Kakteenk. 30: 84. 1920.
Mexico, the range not known.
Solitary or becoming cespitose, globose, 6 to 8 cm. in diameter, dark bluish green, somewhat depressed at apex; tubercles 4-angled, 8 mm. long, not milky, obtuse or truncate at apex, not setose in the axils; spine areoles circular,

white-woolly when young, nearly naked in age; radial spines 18 to 20, acicular, 6 to 8 mm. long, white; central spines 2 to 4, stouter than the radials, spreading, 8 mm. long, reddish brown; flowers small, somewhat distant from the apex of the plant.

68. **Neomammillaria spinosissima** (Lem.) Britt. & Rose, Cactaceae 4: 117. 1923.

Mammillaria spinosissima Lem. Cact. Aliq. Nov. 4. 1838.
Mammillaria polycentra Berg, Allg. Gartenz. 8: 130. 1840.
Mammillaria auricoma Dietr. Allg. Gartenz. 14: 308. 1846.
Mammillaria polyacantha Ehrenb. Allg. Gartenz. 16: 265. 1848.
Mammillaria polyactina Ehrenb. Allg. Gartenz. 16: 266. 1848.
Mammillaria hepatica Ehrenb. Allg. Gartenz. 16: 267. 1848.
Mammillaria pomacea Ehrenb. Allg. Gartenz. 16: 267. 1848.
Mammillaria pulcherrima Ehrenb. Allg. Gartenz. 17: 249. 1849.
Mammillaria pretiosa Ehrenb. Allg. Gartenz. 17: 250. 1849.
Mammillaria caesia Ehrenb. Allg. Gartenz. 17: 251. 1849.
Mammillaria mirabilis Ehrenb. Allg. Gartenz. 17: 251. 1849.
Mammillaria pruinosa Ehrenb. Allg. Gartenz. 17: 261. 1849.
Mammillaria seegeri Ehrenb. Allg. Gartenz. 17: 261. 1849.
Mammillaria haseloffii Ehrenb. Allg. Gartenz. 17: 303. 1849.
Mammillaria herrmannii Ehrenb. Allg. Gartenz. 17: 303. 1849.
Mammillaria aurorea Ehrenb. Allg. Gartenz. 17: 303. 1849.
Mammillaria linkeana Ehrenb. Allg. Gartenz. 17: 308. 1849.
Mammillaria vulpina Ehrenb. Allg. Gartenz. 17: 308. 1849.
Mammillaria eximia Ehrenb. Allg. Gartenz. 17: 309. 1849.
Mammillaria isabellina Ehrenb. Allg. Gartenz. 17: 309. 1849.
Mammillaria uhdeana Salm-Dyck, Cact. Hort. Dyck. 1849. 83. 1850.
Mammillaria castaneoides Lemaire; Labour. Monogr. Cact. 37. 1853.
Mammillaria sanguinea Haage; Regel, Act. Hort. Petrop. 8: 276. 1883.
Mammillaria poselgeriana Haage; Först. Handb. Cact. ed. 2. 269. 1885.

High mountains of Mexico and Morelos, and elsewhere in central Mexico.

Cylindric, 7 to 30 cm. long, 2.5 to 10 cm. in diameter, almost hidden under a dense covering of spines; axils of tubercles setose; tubercles 2 to 3 mm. long; spines yellow to red, usually weak, hardly pungent; radial spines about 20, 1 cm. long or less; central spines 7 or 8, 2 cm. long or more; flowers from the upper part of the plant, purplish, 12 mm. long; inner perianth segments acute.

69. **Neomammillaria densispina** (Coulter) Britt. & Rose, Cactaceae 4: 119. 1923.

Cactus densispinus Coulter, Contr. U. S. Nat. Herb. 3: 96. 1894.
Mammillaria pseudofuscata Quehl, Monatsschr. Kakteenk. 24: 114. 1914.

San Luis Potosí

Globose, 6 to 10 cm. in diameter, entirely hidden by the dense covering of spines; tubercles short and thick, green, not milky; radial spines 25 or more, slightly spreading, about 1 cm. long, whitish or pale yellow; central spines 5 or 6, longer than the radials, 10 to 12 mm. long, the upper half or third dark brown; flowers purple without, yellowish within, 1.5 cm. long; seeds obovate, reddish brown, 1 mm. in diameter.

70. **Neomammillaria nunezii** Britt. & Rose, Cactaceae 4: 120. 1923.

Guerrero, the type from Buenavista de Cuellar.

Globose to cylindric, 1.5 cm. long, 6 to 8 cm. in diameter; tubercles closely set, short, terete, setose in their axils; radial spines white, stiff, about 30,

widely spreading; central spines 2 to 4, stout, 10 to 15 mm. long, brown to nearly blackish at tip; fruit 2.5 cm. long, clavate, white or tinged with pink; seeds small, brown.

71. Neomammillaria amoena (Hoppfer) Britt. & Rose, Cactaceae 4: 120. 1923.

Mammillaria amoena Hoppfer; Salm-Dyck, Cact. Hort. Dyck. 1849. 99. 1850.

Morelos and elsewhere in central Mexico.

Stems robust, columnar; tubercles green, ovoid, obtuse, subglaucous; radial spines 16, slender, radiating, white; central spines 2, rigid, yellowish brown, 8 to 10 mm. long, the upper one longer and recurved; flowers appearing from the axils above the middle of the plant, 2 cm. long, the tube cone-shaped, green; outer perianth segments somewhat brownish, the inner with a pale brown central stripe, the margins nearly white, obtuse, entire.

72. Neomammillaria rhodantha (Link & Otto) Britt. & Rose, Cactaceae 4: 121. 1923.

Mammillaria rhodantha Link & Otto, Icon. Pl. Rar. 51. 1829.
Mammillaria pulchra Haw. in Edwards, Bot. Reg. 16: *pl. 1329*. 1830.
Mammillaria fulvispina Haw. Phil. Mag. 7: 108. 1830.
?*Mammillaria inuncta* Hoffmannsegg, Preiss-Verz. ed. 7. 23. 1833.
Mammillaria erinacea Wendl. Cact. Herrenh. 1835.
Mammillaria chrysacantha Otto; Pfeiff. Enum. Cact. 28. 1837.
Mammillaria fuscata Pfeiff. Enum. Cact. 28. 1837.
Mammillaria tentaculata Otto; Pfeiff. Enum. Cact. 29. 1837.
Mammillaria ruficeps Lem. Cact. Hort. Monv. 37. 1839.
Mammillaria odierana Lem. Cact. Hort. Monv. 46. 1839.
Mammillaria pyrrhochracantha Lem. Cact. Hort. Monv. 51. 1839.
Mammillaria pfeifferi Booth; Scheidw. Bull. Acad. Brux. 6: 93. 1839.
? *Mammillaria crassispina* Pfeiff. Allg. Gartenz. 8: 406. 1840.
Mammillaria stenocephala Scheidw. Allg. Gartenz. 9: 43. 1841.
? *Mammillaria imbricata* Wegener, Allg. Gartenz. 12: 66. 1844.
Mammillaria sulphurea Senke; Först. Handb. Cact. 200. 1846.
Mammillaria robusta Otto; Först. Handb. Cact. 207. 1846.
Mammillaria stueberi Otto; Först. Handb. Cact. 517. 1846.
Mammillaria lanifera Salm-Dyck, Cact. Hort. Dyck. 1849. 98. 1850.
? *Mammillaria russea* Dietr. Allg. Gartenz. 19: 347. 1851.

Probably central Mexico.

Cylindric, 10 to 30 cm. long, erect, dull green; tubercles terete, somewhat narrowed toward the apex, 3 to 5 mm. long, not milky; axils of tubercles sometimes bearing bristles, often naked; radial spines 15 to 20, white, 5 to 7 mm. long; central spines 4 to 6, reddish brown, straight, ascending, much stouter than the radials, 10 to 12 mm. long; flowers numerous, rose-colored, 12 mm. broad; inner perianth segments linear, somewhat spreading, pointed; fruit 2.5 cm. long, cylindric, lilac to red; seeds brownish.

73. Neomammillaria plumosa (Weber) Britt. & Rose, Cactaceae 4: 123. 1923.

Mammillaria plumosa Weber, Dict. Hort. Bois 804. 1898.

Northern Mexico.

Small, growing in dense clusters, sometimes 15 cm. broad, entirely covered by the mass of white spines; tubercles somewhat woolly in their axils, 2 to 3 mm. long; spines about 40, all radial, weak, plumose, 3 to 7 mm. long; flowers white, 3 to 4 mm. long; perianth segments with a red line running down the center; seeds black.

74. **Neomammillaria multiceps** (Salm-Dyck) Britt. & Rose, Cactaceae **4**: 125. 1923.

Mammillaria multiceps Salm-Dyck, Cact. Hort. Dyck. 1849. 81. 1850.

Northeastern Mexico. Texas.

Cespitose, often forming large clumps; separate plants globose to short-oblong, often only 1 to 2 cm. in diameter; tubercles small, terete, hairy in their axils; radial spines hairlike, white; central spines several, pubescent, yellowish at base, dark brown above; flowers about 12 mm. long, whitish to salmon-yellowish, often becoming reddish on the outside; fruit oblong, 8 to 12 mm. long, scarlet; seeds black, 1 mm. long, punctate.

75. **Neomammillaria camptotricha** (Dams) Britt. & Rose, Cactaceae **4**: 126. 1923.

Mammillaria camptotricha Dams, Gartenwelt **10**: 14. 1905.

Deserts of eastern Querétaro.

Plants globose, cespitose, deep green, 5 cm. in diameter; tubercles somewhat elongate, often curved, 2 cm. long, terete, not at all milky, bearing bristles in the axils; spines 2 to 4, described as up to as many as 8, yellowish, bristle-like, spreading and twisted or bent, often 3 cm. long; spine areoles small, circular, a little woolly at first; axils of tubercles bristly; flowers about 1 cm. long; outer perianth segments greenish, the inner white, 10 mm. long, acute.

76. **Neomammillaria eriacantha** (Link & Otto) Britt. & Rose, Cactaceae **4**: 127. 1923.

Mammillaria eriacantha Link & Otto; Pfeiff. Enum. Cact. 32. 1837.

Central Mexico.

Solitary or cespitose, 10 to 15 cm. high, cylindric, 5 cm. in diameter; tubercles spiraled, in 22 rows; radial spines about 20, delicate, spreading, pubescent; central spines 2, widely spreading, stouter than the radials, pubescent, yellowish; flowers borne in a ring above the middle of the plant, yellow, 14 mm. broad; inner perianth segments about 14, linear, acute; fruit at first greenish white, afterwards tinged with red, short-clavate.

77. **Neomammillaria schiedeana** (Ehrenb.) Britt. & Rose, Cactaceae **4**: 128. 1923.

Mammillaria schiedeana Ehrenb.; Schlecht. Allg. Gartenz. **6**: 249. 1838.

?Mammillaria sericata Lem. Cact. Hort. Monv. 44. 1839.

Mammillaria dumetorum Purpus, Monatsschr. Kakteenk. **22**: 149. 1912.

?Mammillaria cephalophora Quehl, Monatsschr. Kakteenk. **24**: 158. 1914.

Central Mexico, the type from Puente de Dios.

Densely cespitose, somewhat soft in texture; axils of tubercles bearing long bristle-like white hairs; tubercles green, terete; radial spines about 30, white, spreading, bristle-like, puberulent; central spines 6 to 10, spreading and appressed against the radials, a little stouter, often tinged with yellow; flowers 15 mm. long; inner perianth segments white.

78. **Neomammillaria lasiacantha** (Engelm.) Britt. & Rose, Cactaceae **4**: 128. 1923.

Mammillaria lasiacantha Engelm. Proc. Amer. Acad. **3**: 261. 1856.

Northern Chihuahua. Texas.

Globose, 2 to 2.5 cm. in diameter; tubercles small, their axils naked; spines 40 to 60, in more than one series, white, puberulent, 2 to 4 mm. long; flowers 12 mm. long, whitish or pink; fruit 1 to 2 cm. long; seeds blackish, pitted.

79. **Neomammillaria denudata** (Engelm.) Britt. & Rose, Cactaceae 4: 129. 1923.

Mammillaria lasiacantha denudata Engelm. U. S. & Mex. Bound. Cact. 5. 1859.

Coahuila. Texas.

Globose, 2.5 to 3.5 cm. in diameter; tubercles 5 to 6 mm. long; spines 50 to 80, glabrous or nearly so, 3 to 5 mm. long, the innermost usually much shorter; flowers and fruit from near the center but not from the axils of young tubercles; flowers 10 to 12 mm. long; perianth segments about 12, oblong, obtuse, the margins white, the center light purple; fruit clavate, red, 1.5 to 2 cm. long; seeds black.

80. **Neomammillaria lenta** (K. Brandeg.) Britt. & Rose, Cactaceae 4: 129. 1923.

Mammillaria lenta K. Brandeg. Zoe 5: 194. 1904.

Coahuila, the type from Viesca.

Described as cespitose; individuals globose to short-cylindric, almost hidden by the white delicate spines; tubercles very slender, light green; spine areoles naked; spines about 40, very fragile; axils woolly and occasionally bearing a single bristle; flowers whitish, 7 mm. long; perianth segments pointed; fruit red, clavate; seeds 1 mm. in diameter, dull black.

81. **Neomammillaria candida** (Scheidw.) Britt. & Rose, Cactaceae 4: 130. 1923.

Mammillaria candida Scheidw. Bull. Acad. Brux. 5: 496. 1838.

Mammillaria sphaerotricha Lem. Cact. Hort. Monv. 33. 1839.

Mammillaria humboldtii Ehrenb. Linnaea 14: 378. 1840.

Central Mexico; type from San Luis Potosí.

Cespitose; individual plants globose, 5 to 7 cm. in diameter, almost hidden by the white spines; radial spines numerous, radiating; central spines 8 to 12, porrect, often brownish at tip, a little stouter than the radials; axils setose; flowers 2 cm. long, rose-colored; perianth segments serrulate toward the apex; fruit red; seeds black.

82. **Neomammillaria vetula** (Mart.) Britt. & Rose, Cactaceae 4: 130. 1923.

Mammillaria vetula Mart. Nov. Act. Nat. Cur. 16: 338. 1832.

Hidalgo; type from San José del Oro.

Plant somewhat club-shaped, 4 to 5 cm. high; tubercles terete, light green, somewhat shining; axils naked or sometimes with a small tuft of wool; radial spines about 25, spreading, white, bristle-like; central spines 1 to 6, stouter than the radials, brownish; flowers 12 to 15 mm. long, borne at upper part of the plant; outer perianth segments red, with yellowish margins, the inner cream-colored.

83. **Neomammillaria fertilis** (Hildm.) Britt. & Rose, Cactaceae 4: 131. 1923.

Mammillaria fertilis Hildm.; Schum. Gesamtb. Kakt. 530. 1898.

Mexico, the range not known.

Cespitose, the individual plant globose to short-cylindric, dark green; tubercles arranged in 8 or 13 rows, a little woolly in their axils; radial spines 7 to 10, acicular, 6 mm. long; central spines 1 or 2, straight, stouter than the radials, 10 mm. long; flowers deep crimson, 2 cm. long; inner perianth segments linear-lanceolate, acute.

84. **Neomammillaria decipiens** (Scheidw.) Britt. & Rose, Cactaceae 4: 131. 1923.

Mammillaria decipiens Scheidw. Bull. Acad. Brux. 5: 496. 1838.
Mammillaria anancistria Lem. Cact. Hort. Monv. 39. 1839.
Mammillaria guilleminiana Lem. Cact. Hort. Monv. 48. 1839.
San Luis Potosí.

Usually cespitose, deep green; tubercles soft, cylindric, about 1 cm. long, their axils bearing 2 or 3 bristles each; radial spines 7 to 9, spreading, slender, white, sometimes yellowish with brown tips, puberulent when young; central spine 1, much longer than the radials, erect or ascending, 15 to 18 mm. long, dark brown; flower 15 mm. long, broadly funnel-shaped; inner perianth segments nearly white or faintly tinged with pink, acute.

85. **Neomammillaria discolor** (Haw.) Britt. & Rose, Cactaceae 4: 132. 1923.

Mammillaria discolor Haw. Syn. Pl. Succ. 177. 1812.
Cactus depressus DC. Cact. Hort. Monsp. 84. 1813. Not *C. depressus* Haw. 1812.
Cactus pseudomammillaris Salm-Dyck, Liste Pl. 1: 1. 1815.
Cactus spini Colla, Mém. Accad. Sci. Torino 33: 133. 1826.
Mammillaria albida Haage; Pfeiff. Enum. Cact. 28. 1837.
Mammillaria aciculata Otto; Pfeiff. Enum. Cact. 29. 1837.
?*Mammillaria curvispina* Otto; Dietr. Allg. Gartenz. 14: 204. 1846.
Mammillaria nitens Otto; Linke, Allg. Gartenz. 16: 331. 1848.
Mammillaria pulchella Otto; Linke, Allg. Gartenz. 16: 331. 1848.
Puebla.

Globose or somewhat depressed, often solitary, about 7 cm. in diameter; tubercles ovoid-conic, arranged in 13 to 15 spirals, their axils naked; radial spines 16 to 20, white, setaceous, widely spreading; central spines about 6, stouter than the radials, straight, at first black with white bases; flowers 15 mm. broad when fully open; inner perianth segments linear, white, with violet-rose band; fruit red, 2.5 cm. long.

86. **Neomammillaria fragilis** (Salm-Dyck) Britt. & Rose, Cactaceae 4: 133. 1923.

Mammillaria fragilis Salm-Dyck, Cact. Hort. Dyck. 1849. 103. 1850.
Mexico, the range not known.

Stems usually oblong or club-shaped, sprouting freely toward the top; branches globose and breaking off at the slighest touch; tubercles bright green, terete, their axils nearly naked; radial spines 12 to 14, white, naked, spreading; central spines usually wanting, especially on branches, if present 1 or 2, elongate, erect, brownish especially at tip; young spine areoles with white wool; flowers from the upper part of plant but not from the center, small, lasting for several days, cream-colored, the outer segments somewhat pinkish; petals broad, with mucronate tip.

87. **Neomammillaria elongata** (DC.) Britt. & Rose, Cactaceae 4: 134. 1923.

Mammillaria elongata DC. Mém. Mus. Hist. Nat. 17: 109. 1828.
Mammillaria subcrocea DC. Mém. Mus. Hist. Nat. 17: 110. 1828.
Mammillaria intertexta DC. Mém. Mus. Hist. Nat. 17: 110. 1828.
Mammillaria tenuis DC. Mém. Mus. Hist. Nat. 17: 110. 1828.
?*Mammillaria densa* Link & Otto, Icon. Pl. Rar. 69. 1830.
Mammillaria stella-aurata Mart.; Zucc. Abh. Akad. Wiss. München 2: 101. 1837.
?*Mammillaria anguinea* Otto; Salm-Dyck, Cact. Hort. Dyck. 1849. 101. 1850.

?*Mammillaria subechinata* Salm-Dyck, Cact. Hort. Dyck. 1849. 101. 1850.
Mammillaria rufocrocea Salm-Dyck, Cact. Hort. Dyck. 1849. 102. 1850.
Eastern Mexico.

Densely cespitose, forming small clumps, erect, ascending, or prostrate, 3 to 10 cm. long, 1 to 1.5 cm. in diameter, almost covered by a mass of interlocking spines; tubercles arranged in few rows, usually in spirals, short, their axils naked; spines usually all radial but sometimes with 1 porrect central spine, yellow or with brown tips, more or less recurved, 8 to 12 mm. long; spine areoles pubescent when young; flowers at the upper part of the plant but from the axils of old tubercles, white or nearly so, rather short and broad, 6 to 7 mm. long; perianth segments about 12, rather broad, obtuse or sometimes apiculate.

88. **Neomammillaria echinaria** (DC.) Britt. & Rose, Cactaceae 4: 136. 1923.
Mammillaria echinaria DC. Mém. Mus. Hist. Nat. 17: 110. 1828.
Mammillaria echinata DC. Mém. Cact. 3. 1834.
Mammillaria gracilis Pfeiff. Allg. Gartenz. 6: 275. 1838.
Hidalgo.

Plants cespitose, often forming large clumps, ascending or spreading, 1 to 1.5 cm. in diameter; tubercles short, terete, their axils naked; spines pale yellow to glossy white; radial spines about 15, spreading; central spines one, straight, acicular, about 1 cm. long; flowers and fruit not known.

89. **Neomammillaria pottsii** (Scheer) Britt. & Rose, Cactaceae 4: 136. 1923.
Mammillaria pottsii Scheer; Salm-Dyck, Cact. Hort. Dyck. 1849. 104. 1850.
Mammillaria leona Poselger, Allg. Gartenz. 21: 94. 1853.
Nuevo León, Coahuila, Chihuahua, and Zacatecas. Texas.

More or less cespitose, the individual plants cylindric, 12 cm. long or more; tubercles almost hidden by the spines; radial spines about 30, white, weak, short; central spines 6 to 12, much stouter and longer, more or less ascending, grayish with brown tips; axils of tubercles woolly; flowers borne in a circle about 2 cm. below the top of the plant, about 1 cm. long; inner perianth segments light purple, somewhat spreading at tip, acute; fruit red, clavate; seeds blackish brown, the surface deeply pitted.

90. **Neomammillaria mazatlanensis** (Schum.) Britt. & Rose, Cactaceae 4: 138. 1923.
Mammillaria mazatlanensis Schum. Monatsschr. Kakteenk. 11: 154. 1901.
Mammillaria littoralis K. Brandeg. Kew Bull. Misc. Inf. 1908: App. 91. 1908.
On hills near the sea, about Mazatlán, Sinaloa.

Plants cespitose, often forming broad clumps with many oblong heads, 4 to 10 cm. long, about 2 cm. in diameter; tubercles terete, 3 to 4 mm. long, their axils naked; radial spines 12 to 15, setaceous, spreading, white; central spines 4 to 6, stouter than the radials, reddish, ascending, 8 to 10 mm. long; flowers from the axils of the old tubercles but toward the top of the plant, 3 cm. long or more, red; perianth segments oblong, spreading.

91. **Neomammillaria sphacelata** (Mart.) Britt. & Rose, Cactaceae 4: 138. 1923.
Mammillaria sphacelata Mart. Nov. Act. Nat. Cur. 16: 339. 1832.
Puebla and Oaxaca.

Usually densely cespitose, often grayish, forming clumps 30 to 40 cm. in diameter, the individual plants cylindric, more or less elongate, often 10 to 20 cm. high; radial spines 14 to 20, usually white with black tips; central spines 3 or 4, usually black or reddish throughout, sometimes becoming white in age; axils of tubercles often bearing tufts of short hairs and occasionally

a few bristles; flowers about 15 mm. long, purplish; fruit red, clavate; seeds black, the surface deeply pitted.

92. Neomammillaria albicans Britt. & Rose, Cactaceae 4: 138. 1923.

Islands of the Gulf of California; type from Santa Cruz Island.

Plants at first globose but becoming cylindric and then 10 to 20 cm. long, up to 6 cm. in diameter, often in clumps of 5 to 15 plants; spines almost hiding the plant body and often pure white; radial spines numerous, short, stiff, widely spreading; central spines several, straight, stiff, often brownish or blackish at tip; spine areoles when young densely white-woolly; fruit clavate, red, 10 to 18 mm. long; seeds black.

93. Neomammillaria slevinii Britt. & Rose, Cactaceae 4: 139. 1923.

Islands of Baja California, the type from San Josef Island.

Plants simple, cylindric, 10 cm. high or more, 5 to 6 cm. in diameter, entirely hidden under the mass of closely set spines; spines at the top of plant pinkish below, with brown to blackish tips, those on the lower part of plant bleaching white; radial spines numerous, acicular, widely spreading; central spines about 6, a little longer and stouter than the radials, slightly spreading; flowers about 2 cm. broad; outer perianth segments with a pinkish midrib, the inner white; fruit red, about 1 cm. long; seeds black.

94. Neomammillaria palmeri (Coulter) Britt. & Rose, Cactaceae 4: 140. 1923.

Mammillaria palmeri Coulter, Contr. U. S. Nat. Herb. 3: 108. 1894.

San Benito Island and possibly Guadalupe Island, Baja California.

Densely cespitose; individuals small; axils densely woolly and bristly; radial spines 25 to 30, slender, white, 5 mm. long, radiating; central spines 3 to 5, stouter and longer than the radials, brownish with black tips, straight, 7 to 8 mm. long; flowers cream-colored, sometimes tinged with pink; fruit clavate, scarlet; seeds black.

95. Neomammillaria uncinata (Zucc.) Britt. & Rose, Cactaceae 4: 140. 1923.

Mammillaria uncinata Zucc.; Pfeiff. Enum. Cact. 34. 1837.

Mammillaria bihamata Pfeiff. Allg. Gartenz. 6: 274. 1838.

Mammillaria depressa Scheidw. Bull. Acad. Brux. 5: 494. 1838.

Hidalgo and San Luis Potosí, and elsewhere in central Mexico.

Globose or somewhat depressed, usually half-buried in the soil, 8 to 10 cm. in diameter; tubercles lactiferous, short, obtuse; axils of old tubercles naked, of young ones lanate, forming a mass of wool at the top; young spine areoles also lanate; radial spines 4 to 6, usually white, subulate, 4 to 5 mm. long; central spines usually solitary, sometimes 2 or 3, much stouter than the radials, 8 to 12 mm. long, brown, hooked at apex; flowers reddish white, about 2 cm. long; inner perianth segments linear-oblong; fruit clavate, 10 to 18 mm. long, red; seeds small, brown.

96. Neomammillaria hamata (Lehm.) Britt. & Rose, Cactaceae 4: 140. 1923.

Cactus cylindricus Orteg. Hort. Matr. Dec. 128. 1800. Not *C. cylindricus* Lam. 1783.

Mammillaria hamata Lehm.; Pfeiff. Enum. Cact. 34. 1837.

Mexico, the range not known.

Stem 60 cm. long, cylindric, somewhat branched at base, said to be milky; tubercles conic or a little compressed; radial spines 15 to 20, white, spreading; central spines several, brownish, stouter than the radials, one of them hooked; flowers small, probably scarlet, from near the top of the plant but from the axils of old tubercles; inner perianth segments lanceolate, acute; fruit slender, clavate, probably red; seeds minute, brown.

97. Neomammillaria rekoi Britt. & Rose, Cactaceae 4: 141. 1923.

Oaxaca.

Globular to short-cylindric, becoming 10 cm. long, 5 to 6 cm. in diameter, not milky; tubercles green, terete, 8 to 10 mm. long, not very closely set, each bearing in its axil a tuft of short white wool and 5 to 8 long white bristles; radial spines spreading, about 20, white, delicately acicular, 4 to 6 mm. long; central spines 4, brown, much stouter than the radials, 10 to 15 mm. long, the lower one usually strongly hooked; flowers from axils of old tubercles, near the top of the plant, 1.5 cm. long, deep purple; inner perianth segments narrowly oblong, apiculate; fruit clavate, red, 12 mm. long; seeds minute, brown.

98. Neomammillaria solisii Britt. & Rose, Cactaceae 4: 142. 1923.

Guerrero, the type from Cerro de Buenavista de Cuellar.

Simple, globose or nearly so, 5 to 7 cm. in diameter, green or becoming purplish; tubercles 8 mm. long, terete, a little narrow toward the tip and thus separated above from the adjoining tubercles, their axils without wool even when young and usually with 1 to many bristles; radial spines 10 to 20, spreading, 6 to 7 mm. long, white, bristle-like; central spines 3 or 4, a little stouter than the radials, becoming brown, one of them strongly hooked (sometimes 2 cm. long); flowers from axils near base of the plant; ovary remaining dormant for a long time (at least a month), then elongating and the fruit maturing quickly, this short-oblong, 10 to 12 mm. long, green; seeds 1 mm. long, brown, pitted.

99. Neomammillaria pygmaea Britt. & Rose, Cactaceae 4: 142. 1923.

Querétaro; type from Cadereyta.

Plant very small, globose to cylindric, 2 to 3 cm. in diameter; tubercles small, obtuse; radial spines about 15, white, stiff, hardly puberulent even under a lens; central spines 4, ascending, golden yellow, the lower one hooked, 5 to 6 cm. long; flowers about 1 cm. long, the outer segments tinged with red, apiculate; inner perianth segments about 10, cream-colored.

100. Neomammillaria wildii (Dietr.) Britt. & Rose, Cactaceae 4: 143. 1923.

Mammillaria wildii Dietr. Allg. Gartenz. 4: 137. 1836.

Hidalgo.

Cylindric to globose, cespitose at base; axils of tubercles bearing rose-colored hairs and bristles; tubercles slender, elongate, 8 to 10 mm. long, obtuse, green or somewhat rose-colored at base; young areoles tomentose; spines all puberulent; radial spines 8 to 10, 8 mm. long, setiform, white; central spines 4, yellow, one of them hooked; flowers white, 12 mm. in diameter; inner perianth segments acuminate; fruit clavate, red.

101. Neomammillaria seideliana (Quehl) Britt. & Rose, Cactaceae 4: 144. 1923.

Mammillaria seideliana Quehl, Monatsschr. Kakteenk. 21: 154. 1911.

Zacatecas.

Solitary, globose, becoming cespitose, 3 to 4 cm. in diameter; tubercles purplish, their axils naked; radial spines 20 to 25, white, long and slender, ascending, puberulent; central spines yellow, 3 or 4, one hooked, puberulent when young; flowers arising from near the top of the plant, 15 to 18 mm. long, creamy yellow, the outer perianth segments brownish, the inner oblong, acute; fruit persisting in the axils of the tubercles apparently for a number of years; seeds black.

102. Neomammillaria barbata (Engelm.) Britt. & Rose, Cactaceae 4: 144. 1923.

Mammillaria barbata Engelm. in Wisliz. Mem. North. Mex. 105. 1848.

Chihuahua, the type from Cosihuirachi.

Often densely cespitose, globose, 3 to 4 cm. in diameter; radial spines 20 or more, acicular, spreading or ascending, white, sometimes with brown tips; central spines several, subulate, brown, puberulent, 1 or 2 hooked; flowers 15 mm. long; outer perianth segments ovate to lanceolate, ciliate, the inner erect or spreading at tip, light straw-colored or greenish, brown without, acute.

103. Neomammillaria mercadensis (Patoni) Britt. & Rose, Cactaceae 4: 145. 1923.

Mammillaria mercadensis Patoni, Alianza Cient. Univ. 1: 54. 1910.

Mammillaria ocamponis Ochoterena, Méx. Estud. Biol. Bol. 2: 355. 1918.

Durango, the type from Cerro de Mercado.

Solitary or cespitose, small, globose; radial spines numerous, sometimes 25, widely spreading, white; central spines 4 or 5, elongate, much longer than the flowers, one of them strongly hooked at apex; flowers small, pale rose-colored; perianth segments oblong, obtuse.

104. Neomammillaria kunzeana (Bödek. & Quehl) Britt. & Rose, Cactaceae 4: 145. 1923.

Mammillaria kunzeana Bödek. & Quehl, Monatsschr. Kakteenk. 22: 177. 1912.

Mexico, the range not known.

Cespitose, globose or sometimes becoming cylindric, light green; tubercles cylindric, setose in their axils; radial spines about 25, white, setaceous; central spines 3 or 4, brown, puberulent, one of them hooked; flowers white or yellowish white, rose-colored on the outside, 2 cm. long; inner perianth segments acuminate.

105. Neomammillaria hirsuta (Bödeker) Britt. & Rose, Cactaceae 4: 146. 1923.

Mammillaria hirsuta Bödeker, Monatsschr. Kakteenk. 29: 130. 1919.

Mexico, the range not known.

Solitary, becoming cespitose, somewhat globose, 6 cm. in diameter; tubercles 10 mm. long, in 8 or 13 spiraled rows, cylindric, their axils setose; spine areoles naked; radial spines about 20, white, 10 to 15 mm. long; central spines 3 or 4, the lower one hooked; flowers 10 mm. long.

106. Neomammillaria multihamata (Bödeker) Britt. & Rose, Cactaceae 4: 146. 1923.

Mammillaria multihamata Bödeker, Monatsschr. Kakteenk. 25: 76. 1915.

Mexico, the range not known.

Short-cylindric, about 5 cm. in diameter; tubercles cylindric, setose in their axils; spine areoles white-lanate; radial spines 25, acicular, white, 8 mm. long; central spines 7 to 9, several of them hooked; flowers numerous from near the top of the plant, 1.5 cm. long; inner perianth segments narrow, acute, spreading; seeds blackish brown.

107. Neomammillaria longicoma Britt. & Rose, Cactaceae 4: 146. 1923.

San Luis Potosí.

Cespitose, often forming broad clumps; individual specimens 3 to 5 cm. in diameter; tubercles conic, 4 to 5 mm. long, dark green, obtuse, bearing long white hairs in their axils; radial spines 25 or more, weak and hairlike, more or less interlocking; central spines 4, 10 to 12 mm. long, brown above, a little

paler below, 1 or 2 hooked; flowers from the axils of the upper tubercles; outer perianth segments pinkish, darker along the center, the inner lanceolate, acute, nearly white, sometimes tinged with rose (?).

108. Neomammillaria bocasana (Poselg.) Britt. & Rose, Cactaceae 4: 147. 1923.

Mammillaria bocasana Poselger, Allg. Gartenz. 21: 94. 1853.

Northern central Mexico; type from Sierra de Bocas, San Luis Potosí.

Cespitose, often forming large mounds; individual plants globose, 3 to 4 cm. in diameter, light green; tubercles slender, 6 to 8 mm. long, terete, their axils sometimes hairy or bristly; radial spines represented by numerous long white silky hairs; central spines solitary, 5 to 8 mm. long, brown but paler at base, hooked, much shorter than the radial spines; flowers described as white; perianth segments lance-linear, acute, spreading; fruit "green, 4 mm. long; seeds cinnamon brown."

109. Neomammillaria multiformis Britt. & Rose, Cactaceae 4: 148. 1923.

San Luis Potosí, the type from Alvarez.

Cespitose, forming dense clumps, sometimes 25 or more from a single root, either globose or much elongate and 3 to 6 times as long as thick; tubercles terete, 6 to 8 mm. long, their axils bearing long white bristles and white wool; radial spines 30 or more, acicular, 8 mm. long, yellow or at least becoming so, ascending; central spines 4, a little longer and stouter than the radials, nearly erect, reddish in the upper part, one of them strongly hooked; flowers deep purplish red, 8 to 10 mm. long, usually broader than long; inner perianth segments oblong, acute; fruit never globose, at least when dry; seeds black.

110. Neomammillaria scheidweileriana (Otto) Britt. & Rose, Cactaceae 4: 148. 1923.

Mammillaria scheidweileriana Otto; Dietr. Allg. Gartenz. 9: 179. 1841.

Mammillaria monancistria Berg; Schum. Gesamtb. Kakt. 533. 1898.

Mexico, the range not known.

Cespitose, globose to cylindric, light green; tubercles setose in their axils, in 8 and 13 spirals, cylindric; spines all puberulent; radial spines 9 to 11, setaceous, white, 1 cm. long; central spines 1 to 4, brown, 1 or 2 hooked; flowers rose-colored, 12 to 13 mm. long.

111. Neomammillaria saffordii Britt. & Rose, Cactaceae 4: 149. 1923.

Type from Icamole, Nuevo León.

Plants small, globose to short-cylindric, 3 to 4 cm. high, dull green, nearly hidden under the dense covering of spines; axils naked; spine areoles when quite young slightly woolly but early glabrate, circular; spines all puberulent under a lens when young; radial spines 12 to 14, somewhat ascending but in age more or less curved outward, when just developing with bright red tips and white bases, later the lower part becoming yellowish; central spines single, stout, reddish, 1.5 cm. long, hooked at apex; flowers 2.5 cm. long, rose-colored; outer perianth segments tipped by long bristles, the inner obtuse.

112. Neomammillaria schelhasei (Pfeiff.) Britt. & Rose, Cactaceae 4: 149. 1923.

Mammillaria schelhasei Pfeiff. Allg. Gartenz. 6: 274. 1838.

Hidalgo, the type from Mineral del Monte.

Cespitose, forming a large hemispheric mound; individual plants globose to short-cylindric, olive-green; tubercles cylindric, their axils a little woolly but not setose; radial spines 14 to 16, setaceous, white; central spines 3, brown, one of them hooked at apex; flowers 2.2 to 2.5 cm. long, salmon or rose-colored; fruit 5 mm. long.

113. Neomammillaria glochidiata (Mart.) Britt. & Rose, Cactaceae 4: 149. 1923.

Mammillaria glochidiata Mart. Nov. Act. Nat. Cur. 16: 337. 1832.

?*Mammillaria ancistroides* Lehm. Del. Sem. Hort. Hamb. 1832.

Southern Mexico.

Densely cespitose, forming clusters sometimes 15 cm. high; tubercles cylindric, green, shining, 8 to 15 mm. long, well separated from one another toward the tip, obtuse, terete; radial spines 12 to 15, widely spreading, puberulent, white, setiform, 10 to 12 mm. long; central spines 4, brownish, one of them hooked; flowers white; inner perianth segments lanceolate, acuminate; fruit clavate, scarlet, 16 mm. long; seeds black.

114. Neomammillaria trichacantha (Schum.) Britt. & Rose, Cactaceae 4: 151. 1923.

Mammillaria trichacantha Schum. Gesamtb. Kakt. Nachtr. 133. 1903.

Mexico, the range not known.

Solitary, globose to short-cylindric, small; tubercles clavate, 4 to 5 cm. high, slightly glaucous; radial spines 15 to 18, pubescent, acicular, white, 8 mm. long; central spines 2, brownish, 12 mm. long, one of them hooked; flowers red or yellow, 1.5 cm. long; inner perianth segments lanceolate, widely spreading, acuminate.

115. Neomammillaria painteri (Rose) Britt. & Rose, Cactaceae 4: 151. 1923.

Mammillaria painteri Rose; Quehl, Monatsschr. Kakteenk. 27: 22. 1917.

Mammillaria erythrosperma Bödeker, Monatsschr. Kakteenk. 28: 101. 1918.

Central Mexico, the type from San Juan del Río, Querétaro.

Plant globose, 2 cm. in diameter, almost hidden by the spines; tubercles without bristles in their axils; radial spines about 20, stiff, white, puberulent under a hand lens; central spines 4 or 5, ascending, dark brown, one hooked, puberulent; flowers 15 mm. long. greenish white, the outer segments brownish; inner perianth segments broad, with an ovate acute tip.

116. Neomammillaria mainae (K. Brandeg.) Britt. & Rose, Cactaceae 4: 154. 1923.

Mammillaria mainae K. Brandeg. Zoe 5: 31. 1900.

Northern Sonora; type collected south of Nogales.

Globose or somewhat depressed, 5 to 8 cm. broad; tubercles pale green, naked in their axils; spines all puberulent, at least when young; radial spines about 10, widely spreading, yellowish or white except the brownish tips; central spines usually stout, yellowish except the strongly hooked tip; flowers from the upper part of the plant but in the old axils, about 2 cm. long, the outer segments with a brownish stripe, the inner ones with a reddish central stripe, with broad, nearly white margins, acute; fruit red, globose to obovate, not projecting beyond the tubercles; seeds dull black, 1 mm. long, punctate.

117. Neomammillaria boedekeriana (Quehl) Britt. & Rose, Cactaceae 4: 154. 1923.

Mammillaria boedekeriana Quehl, Monatsschr. Kakteenk. 20: 108. 1910.

Mexico, the range not known.

Globose to ovoid, but in collections becoming cylindric, dull green; tubercles cylindric; radial spines about 20, white; central spines 3, brownish black, one hooked; axils naked; flowers white, with brownish stripes.

118. **Neomammillaria microcarpa** (Engelm.) Britt. & Rose, Cactaceae 4: 155. 1923.

Mammillaria microcarpa Engelm. in Emory, Mil. Reconn. 157. 1848.

Mammillaria grahamii Engelm. Proc. Amer. Acad. 3: 262. 1856.

Chihuahua and Sonora. Texas.

Globose to cylindric, simple or branched either at base or near the middle, often cespitose, sometimes 8 cm. high; tubercles small, corky when old; axils of tubercles naked; radial spines 15 to 30, spreading, white, sometimes with dark tips, slender, rigid, glabrous, 6 to 12 mm. long; central spines 1 to 3, dark, when more than one the lower stouter, often 18 mm. long, hooked; flowers from near the top of the plant, 2 to 2.5 cm. long, broadly funnel-shaped; outer perianth segments ovate, obtuse, short-ciliate, the inner purplish, sometimes with whitish margins, obovate, acuminate; fruit clavate, 2 to 2.5 cm. long, scarlet; seeds black, shining, pitted.

Cactus eschanzieri Coulter (Contr. U. S. Nat. Herb. 3: 104. 1894), described from San Luis Potosí, is probably closely related to this species.

119. **Neomammillaria sheldonii** Britt. & Rose, Cactaceae 4: 156. 1923.

Sonora, the type from Hermosillo.

Stems slender-cylindric, about 8 cm. high; axils of tubercles without setae; radial spines 12 to 15, pale with dark tips, the 3 or 4 upper ones darker, a little stouter and 1 or 2 of them subcentral, the true central erect or porrect with an upturned hook at the end; outer perianth segments ciliate, the inner about 10, broad, acute, light purple with very pale margins.

120. **Neomammillaria armillata** (K. Brandeg.) Britt. & Rose, Cactaceae 4: 157. 1923.

Mammillaria armillata K. Brandeg. Zoe 5: 7. 1900.

Southern Baja California; type from San José del Cabo.

In clusters of 3 to 12, cylindric, sometimes 30 cm. high; tubercles bluish green, somewhat angled; axils setose and slightly woolly; radial spines 9 to 15, 7 to 12 mm. long, yellowish; central spines 1 to 4 but usually 2, brownish, the lowest one hooked and a little longer than the others; flowers 10 to 12 mm. long, greenish to flesh-colored; fruit red, clavate, 15 to 30 mm. long; seeds black, punctate.

121. **Neomammillaria fraileana** Britt. & Rose, Cactaceae 4: 157. 1923.

Islands of Baja California; type from Pichilinque Island.

Stems elongate, cylindric, 1 to 1.5 cm. long; axils of tubercles naked or containing at most a single bristle; central spines dark brown, one of them strongly hooked; flowers rather large, pinkish; inner perianth segments acuminate, 2 to 2.5 cm. long, often lacerate toward the tip.

122. **Neomammillaria swinglei** Britt. & Rose, Cactaceae 4: 158. 1923.

Sonora; type from Guaymas.

Stems cylindric, 10 to 20 cm. long, 3 to 5 cm. in diameter; axils of tubercles more or less setose; radial spines rather stout for this group, spreading, dull white with dark tips; central spines 4, ascending, dark brown or black, the lowest one elongate (1 to 1.5 cm.), hooked at apex or sometimes straight; outer perianth segments greenish or sometimes pinkish, the margins somewhat scarious; inner perianth segments narrowly oblong, nearly white, with a brown stripe down the center; fruit red, clavate, 18 mm. long; seeds 1 mm. in diameter, black.

123. Neomammillaria dioica (K. Brandeg.) Britt. & Rose, Cactaceae 4: 158. 1923.

Mammillaria dioica K. Brandeg. Erythea 5: 115. 1897.

Mammillaria fordii Orcutt, West Amer. Sci. 13: 49. 1902.

Northwestern Baja California. Southern California.

Either solitary or clustered, cylindric, 5 to 25 cm. high or even higher; axils of tubercles woolly and short-setose; radial spines 11 to 22, white, the tips often brownish to black or rose-colored throughout, 5 to 7 mm. long, spreading; central spines 3 or 4, brownish, the lower one a little longer than the others and hooked; flowers borne toward the top of the plant, yellowish white with purplish midrib, 10 to 22 mm. long, incompletely dioecious; outer perianth segments reddish, especially along the midrib; the inner oblong, pale cream-colored, notched or toothed near the apex; fruit scarlet, clavate, 10 to 25 mm. long; seeds black.

124. Neomammillaria goodridgei (Scheer) Britt. & Rose, Cactaceae 4: 158. 1923.

Mammillaria goodridgei Scheer; Salm-Dyck, Cact. Hort. Dyck. 1849. 91. 1850.

Cedros Island and the adjacent mainland of Baja California; type from Cedros Island.

Stems clustered, erect, globose to cylindric, up to 10 cm. long, 3 to 4 cm. in diameter; axils of tubercles not setose; radial spines 12 to 15, spreading, white, sometimes with dark tips; central spine usually 1, white below, brown above, the lower one hooked; flowers perfect, rose-colored, 15 mm. long; segments oblong, obtuse or retuse; fruit clavate, 1.5 to 2 cm. long, scarlet, naked; seeds black, punctate. "Llavina."

125. Neomammillaria zephyranthoides (Scheidw.) Britt. & Rose, Cactaceae 4: 159. 1923.

Mammillaria zephyranthoides Scheidw. Allg. Gartenz. 9: 41. 1841.

Mammillaria fennelii Hopffer, Allg. Gartenz. 11: 3. 1843.

Oaxaca.

Depressed-globose to short-cylindric, up to 35 mm. high, 25 mm. in diameter; tubercles 6 mm. long; radial spines 14 to 18, 8 to 10 mm. long, very slender, white; central spine 1 (sometimes 2), larger than the radials and hooked, at first purple but in age yellowish at base; flowers large, with rotate limb and exserted stamens and style; perianth segments white with red stripes.

126. Neomammillaria carretii (Rebut) Britt. & Rose, Cactaceae 4: 160. 1923.

Mammillaria carretii Rebut; Schum. Gesamtb. Kakt. 542. 1898.

Mexico, the range not known.

Solitary, dull green, globose, depressed, 5 to 6 cm. in diameter; tubercles cylindric; axils of tubercles naked; radial spines 14, subulate, spreading, recurved, nearly clothing the plant, long, yellowish; central spine 1, slender, chestnut-brown, hooked; flowers 2.5 cm. long; inner perianth segments white, streaked with rose.

127. Neomammillaria jaliscana Britt. & Rose, Cactaceae 4: 160. 1923.

Type from Río Blanco near Guadalajara, Jalisco.

Cespitose, globose, 5 cm. in diameter, bright green; tubercles in 13 rows, 4 or 5 mm. high; radial spines 30 or more, at right angles to the tubercles; central spines 4 to 6, reddish brown, darker toward the tips, one of them strongly hooked; axils naked; flowers purplish, 1 cm. broad.

128. Neomammillaria bombycina (Quehl) Britt. & Rose, Cactaceae 4: 161. 1923.

Mammillaria bombycina Quehl, Monatsschr. Kakteenk. **20**: 149. 1910.

Mexico, the range not known.

Cylindric, 15 to 20 cm. long, 5 to 6 cm. in diameter; tubercles spiraled, obtuse; young areoles conspicuously white-woolly; radial spines numerous, acicular, widely spreading, 1 cm. long or less; central spines 4, elongate, a little spreading, those toward the top of plant erect, 2 cm. long, brown except at base, the lower one hooked; flowers from near the top, light purple, about 1 cm. long; perianth segments narrowly oblong.

129. Neomammillaria occidentalis Britt. & Rose, Cactaceae 4: 161. 1923.

Type from Manzanillo, Colima.

Cespitose, the branches slender, cylindric, 10 cm. high, densely spiny; radial spines about 12, yellowish, spreading; central spines 4 or 5, reddish or brown, one of them longer and hooked; flowers 1 cm. long, pink; fruit said to be red.

130. Neomammillaria nelsonii Britt. & Rose, Cactaceae 4: 163. 1923.

Type from cliffs at La Solada, Michoacán.

Globose, 5 cm. in diameter; tubercles numerous, terete, apparently not milky, 5 to 7 mm. long, their axils naked; radial spines about 15, acicular, white, 6 to 8 mm. long, spreading; central spines several, all like the radials but one of them elongate, stouter, and longer than the others, brown to black, strongly hooked, 12 to 15 mm. long; fruit very slender, clavate, 3 cm. long or more, red, few-seeded; seeds globose, black, rugose, 2 mm. in diameter.

131. Neomammillaria longiflora Britt. & Rose, Cactaceae 4: 163. 1923.

Durango; type from Santiago Papasquiaro.

Solitary or clustered, 3 cm. in diameter, apparently not at all milky; tubercles terete, not grooved on upper side, 5 to 7 mm. long, rather closely set and nearly hidden by the spines; radial spines about 30, acicular, 10 to 13 mm. long, yellow or straw-colored, somewhat spreading; central spines 4, reddish brown, much stouter than the radials, 3 of them straight, about the length of the radials, 1 of them hooked at apex, twice as long as the others; flowers several, even on small plants, borne near the top, 2 cm. long or more, with a distinct narrow tube; perianth segments pinkish, oblong, acute; ovary very small, ovoid, more or less sunken in the axils, thin above and perhaps dehiscing by an operculum, the lower part with the seeds persisting for years; seeds nearly globose, minutely pitted, 1 to 1.5 mm. in diameter, black.

132. Neomammillaria tacubayensis (Fedde) Britt. & Rose, Cactaceae 4: 164. 1923.

Mammillaria tacubayensis Fedde, Nov. Gen. Sp. Ind. 1905. 443. 1905.

Type from Tacubaya, Distrito Federal.

Globose, 3 to 5 cm. in diameter; radial spines 35 to 40, white, 3 to 5 mm. long; central spine 1, black, 5 to 6 mm. long, hooked; flowers 1.5 cm. long.

133. Neomammillaria umbrina (Ehrenb.) Britt. & Rose, Cactaceae 4: 164. 1923.

Mammillaria umbrina Ehrenb. Allg. Gartenz. **17**: 287. 1849.

Hidalgo.

Simple or becoming cespitose, cylindric, 10 to 12.5 cm. high, dull green; tubercles conic; axils of tubercles naked; radial spines 22 to 25, spreading, white, 4 to 6 mm. long; central spines 4, 3 being 8 to 10 mm. long, one being 20 to 24 mm. long, hooked; flowers 2 cm. long; inner perianth segments about 15, narrowly lanceolate, acute, purple.

134. **Neomammillaria verhaertiana** (Bödeker) Britt. & Rose, Cactaceae 4: 164. 1923.

Mammillaria verhaertiana Bödeker, Monatsschr. Kakteenk. 22: 152. 1912. Mexico.

Solitary, short-cylindric; tubercles subconic, their axils setose; radial spines 20 or more, yellowish, setaceous, 1 cm. long, glabrous; central spines 4 to 8, stouter than the radials, brown at tip, one of them hooked at apex; flowers white, 2 cm. long, appearing in a circle below the top of the plant; outer perianth segments broadly lanceolate, yellowish white.

Besides the species formally listed here, there remain numerous others published under the generic name *Mammillaria*, but they have been so poorly described that their identity is likely to remain unsolved.

51. EPIPHYLLUM Haw. Syn. Pl. Succ. 197. 1812.

Plants mostly epiphytic, the main stem often terete and woody; branches usually much flattened, often thin and leaflike, sometimes 3-winged; areoles small, borne along the margins of the flattened branches; spines usually wanting in mature plants but often represented in seedlings and juvenile forms by slender bristles; flowers usually large, in some species nocturnal, in others diurnal, either odorless or very fragrant; flower tube longer than the limb, in some species greatly elongate; filaments usually long, borne at the top of the tube or scattered over the surface of the throat; style elongate, white or colored; stigma lobes several, linear; fruit globular or short-oblong to narrowly oblong, often with low ridges, sometimes tubercled, red or purple, edible or insipid, when mature splitting down one side and exposing the white or crimson pulpy interior; seeds black, shining.

Several species besides those listed here occur in tropical America.

Ultimate joints acuminate.
- Flowers 25 to 30 cm. long—1. **E. oxypetalum.**
- Flowers 10 to 15 cm. long—2. **E. caudatum.**

Ultimate joints acute, obtuse, or rounded.
- Joints deeply lobed.
  - Lobes of joints spreading; outer perianth segments lemon-yellow. **3. E. darrahii.**
  - Lobes of joints pointing forward; outer perianth segments reddish yellow. **4. E. anguliger.**
- Joints crenate or nearly entire.
  - Joints very stiff—5. **E. strictum.**
  - Joints flexible—6. **E. stenopetalum.**

1. **Epiphyllum oxypetalum** (DC.) Haw. Phil. Mag. 6: 109. 1829.

Cereus oxypetalus DC. Prodr. 3: 470. 1828.

Cereus latifrons Pfeiff. Enum. Cact. 125. 1837.

Phyllocactus oxypetalus Link; Walp. Repert. Bot. 2: 341. 1843.

Phyllocactus latifrons Link; Walp. Repert. Bot. 2: 341. 1843.

Phyllocactus purpusii Weing. Monatsschr. Kakteenk. 17: 34. 1907.

Mexico, often cultivated. Central America to Brazil.

Plants stout, 3 meters long or more, much branched; branches flat and thin, 10 to 12 cm. broad, long-acuminate, deeply crenate; flowers opening in the evening, drooping and limp after anthesis, fragrant; tube of flower 13 to 15 cm. long, rather stout, red, about 1 cm. thick, bearing distant nar-

row scales about 10 mm. long; outer perianth segments narrow, reddish to amber, 8 to 10 cm. long, the inner oblong, white; stamens numerous, white; style white, thick, 20 cm. long; stigma lobes numerous, cream-colored, entire. "Reina de la noche," "junco oloroso;" "flor de baile" (Venezuela); "galán de noche" (El Salvador).

2. **Epiphyllum caudatum** (Vaupel) Britt. & Rose, Contr. U. S. Nat. Herb. **16**: 256. 1913.

Phyllocactus caudatus Vaupel, Monatsschr. Kakteenk. **23**: 116. 1913.

Oaxaca, the type from Comaltepec.

Old stems terete and slender; lateral branches elongate-lanceolate, cuneately narrowed at base into a terete stalk, long-acuminte, 15 to 20 cm. long, 3 to 4 cm. wide, the margins low-crenate; flowers white, the tube slender, about 7 cm. long; inner perianth segments about 6 cm. long; ovary and most of the flower tube quite naked.

3. **Epiphyllum darrahii** (Schum.) Britt. & Rose, Contr. U. S. Nat. Herb. **16**: 256. 1913.

Phyllocactus darrahii Schum. Gesamtb. Kakt. Nachtr. 69. 1903.

Much cultivated in Mexico; probably also wild.

Stems much branched, often terete and woody below; joints rather thick, 20 to 30 cm. long, 3 to 5 cm. wide, deeply lobed, sometimes nearly to the midrib, the lobes usually obtuse; tube of flower 9 cm. long, somewhat curved, greenish; scales on tube and ovary small, linear, green, appressed; outer perianth segments 10, linear, spreading or reflexed, acute, 4 cm. long, lemon-yellow; inner perianth segments pure white, nearly as long as the outer, broader and more erect, short-acuminate; filaments white, nearly as long as the perianth segments; style overtopping the stamens, pure white; stigma lobes 8, linear.

4. **Epiphyllum anguliger** (Lem.) Don; Loud. Encycl. Pl. ed. 3. 1380. 1855.

Phyllocactus anguliger Lem. Jard. Fleur. **1**: *pl. 92.* 1851.

Phyllocactus serratus Brongn.; Labour. Monogr. Cact. 417. 1853.

Central and southern Mexico, the type from Matanejo.

Much branched; stems and lower branches terete; upper branches flattened, with deeply toothed margins, rather fleshy; areoles small, usually felted and sometimes bearing 1 or 2 white bristles; flower tube stout, without scales, about 8 cm. long; outer perianth segments brownish yellow, the inner white, oblong, acuminate, about 5 cm. long; style slender, white. "Pitayita del cerro," "jarana de pitahayita," "nopalillo," "nopalillo blanco."

5. **Epiphyllum strictum** (Lem.) Britt. & Rose, Contr. U. S. Nat. Herb. **16**: 259. 1913.

Phyllocactus strictus Lem. Illustr. Hort. Lem. **1**: Misc. 107. 1854.

Southern Mexico. Central America.

Plant up to 2 meters long; joints linear, green, 5 to 8 cm. broad, coarsely serrate, stiff; tube of flower 13 to 15 cm. long, slender, green, bearing a few distant scales 8 to 12 mm. long; outer perianth segments greenish pink, the inner white, narrow, acuminate, 6 to 8 cm. long; filaments white; style pink or red; stigma lobes yellow; fruit globose, 4 to 5 cm. in diameter; seeds black.

6. **Epiphyllum stenopetalum** (Först.) Britt. & Rose, Contr. U. S. Nat. Herb. **16**: 259. 1913.

Phyllocactus stenopetalus Först. Handb. Cact. 441. 1846.

Oaxaca.

Described as with the habit of *Epiphyllum latifrons* but with different flowers, these delicately fragrant; flower tube 12 to 15 cm. long, bearing small spreading rose-colored scales; outer perianth segments rose-colored to reddish green, the inner white, elongate, linear (7 to 8 cm. long, 4 to 7 mm. broad), spreading or recurved; stamens somewhat exserted; style slender, pink or purplish; stigma lobes 12 to 14, yellow.

HYBRID SPECIES.

EPIPHYLLUM ACKERMANNII Haw. Phil. Mag. 6: 109. 1829.

Phyllocactus ackermannii Lindl. in Edwards, Bot. Reg. 16: *pl. 1331.* 1830. Mexico.

Branches weak, flat and thin, with crenate margins; areoles felted, often bristly or with weak spines, especially on the young growth; flowers day-blooming, very large, sometimes 15 to 20 cm. broad, crimson; inner perianth segments oblong, acute; filaments long, weak, declined; style more or less declined, pinkish; stigma lobes white; ovary more or less bristly.

This species is commonly grown in hothouses. It is believed to be of hybrid origin.

52. CHIAPASIA Britt. & Rose, Cactaceae 4: 203. 1923.

The genus consists of a single species.

1. Chiapasia nelsonii Britt. & Rose, Cactaceae 4: 203. 1923.

Epiphyllum nelsonii Britt. & Rose, Contr. U. S. Nat. Herb. 16: 257. 1913.

Phyllocactus nelsonii Vaupel, Monatsschr. Kakteenk. 23: 116. 1913.

Phyllocactus chiapensis Purpus, Monatsschr. Kakteenk. 28: 118. 1918.

Chiapas, the type from Chicharras.

Branches 60 to 120 cm. long, slender and terete below, flat and thin above, 3 to 4 cm. broad, the margin low, crenate; flowers light rose-red, the tube 2 to 3 cm. long, the segments about 6 cm. long, narrow, acute.

53. NOPALXOCHIA Britt. & Rose, Cactaceae 4: 204. 1923.

The genus consists of a single species.

1. Nopalxochia phyllanthoides (DC.) Britt. & Rose, Cactaceae 4: 205. 1923.

Cactus phyllanthoides DC. Cat. Hort. Monsp. 84. 1813.

Cactus speciosus Bonpl. Descr. Pl. Rar. 8. 1813. Not *C. speciosus* Cav. 1803.

Cactus elegans Link, Enum. Pl. 2: 25. 1822.

Epiphyllum phyllanthoides Sweet, Hort. Brit. 172. 1826.

Phyllocactus phyllanthoides Link, Handb. Gewächs. 2: 11. 1831.

Supposed to be a native of Mexico or Colombia, but known only from cultivated plants; commonly cultivated in Mexico.

Stems somewhat woody, branching, the branches terete at base, flattened and thin above, sometimes 5 cm. broad, green; margin of branches coarsely crenate; flowers diurnal, rose or red, the tube 2 cm. long; inner perianth segments oblong, more or less spreading; filaments and style elongate, slender; stigma lobes 5 to 7. "Nopalillo," "Marta."

54. RHIPSALIS Gaertn. Fruct. & Sem. 1: 137. 1788.

Plants sometimes growing in humus but usually epiphytic and hanging from trees, sometimes erect, sometimes clambering over rocks, more or less rooting or, when hanging, irregularly producing aerial roots; stems usually much branched (often heteromorphic), terete, angled, or much flattened and leaflike, very slender and threadlike or stout and stiff; leaves wanting or represented

by minute bracts; areoles borne along the margin of the flat-branched forms, along the ribs or scattered irregularly in the other forms, usually small, bearing hairs, wool, bristles and flowers; flowers usually solitary, small; perianth segments distinct, few, sometimes only 5, usually spreading, sometimes reflexed; filaments few or numerous, erect, slender, borne on the outer margin of the disk in one or two rows; stigma lobes 3 or more, usually slender, spreading; ovary small, sometimes depressed or sunken in the branch; fruit globular or oblong, sometimes angled when immature, but finally turgid, juicy, white or colored, usually naked.

Numerous other species occur in tropical America, mostly in South America.

Stems terete----1. **R. cassutha.**
Stems flattened----2. **R. purpusii.**

1. **Rhipsalis cassutha** Gaertn. Fruct. & Sem. 1: 137. 1788.

Eastern Mexico. West Indies and South America.

Epiphytic or saxicolous, usually growing on trunk or branches of large trees, hanging in large clusters, 1 to 4 meters long, the branches weak and pendent, when young bearing 5 to 9 white bristles at the areoles, when old naked, terete, sometimes producing aerial roots, often only 3 mm. in diameter, light green, usually growing from the tips of other branches, generally in pairs but sometimes in clusters of 6 or 8; flowers lateral, solitary, small, greenish in bud, sometimes subtended by a single bristle; petals 2 mm. long, cream-colored; ovary exserted; fruit naked, white, maturing a few days after flowering, globose, 5 mm. in diameter.

2. **Rhipsalis purpusii** Weingart, Monatsschr. Kakteenk. 28: 78. 1918.

Chiapas; type from Cerro de Boquerón.

Plant epiphytic; stems 8 mm. in diameter, woody, terete, brown; branches weak, elongate, terete below, flattened above, thin, remotely crenate; flowers small, white, solitary.

117. THYMELAEACEAE. Mezereum Family.

1. DAPHNOPSIS Mart. & Zucc. Nov. Gen. & Sp. 1: 65. 1824.

Reference: Meisner in DC. Prodr. 15: 520–524. 1856.

Trees or shrubs; leaves alternate, entire, coriaceous, estipulate; flowers by abortion dioecious, umbellate or subracemose, axillary or terminal; perianth of staminate flower with a slender tube and 4 spreading lobes; stamens 8, 4 inserted on the perianth lobes and 4 in the throat, the anthers sessile; perianth of pistillate flower smaller, turbinate or urceolate; style short, the stigma capitate; fruit subglobose, 1-seeded, drupaceous, with thin pericarp.

Leaves variously pubescent beneath.
  Leaves densely tomentose beneath with matted hairs----1. **D. purpusii.**
  Leaves covered beneath with straight stiff hairs----2. **D. mollis.**
Leaves glabrous beneath, except sometimes when very young.
  Leaves elliptic-lanceolate, broadest at or below the middle----3. **D. lindenii.**
  Leaves obovate to linear-oblanceolate, broadest above the middle.
    Peduncles elongate, much longer than the flowers----4. **D. bonplandii.**
    Peduncles short, usually shorter than the combined flower and pedicel.
      Leaves linear-oblanceolate, 5 to 10 cm. long, 8 to 14 mm. wide.
      5. D. salicifolia.
      Leaves oblong-oblanceolate, 3.5 to 7 cm. long, 10 to 20 mm. wide.
      6. D. cestrifolia.

1. **Daphnopsis purpusii** T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 89. 1910.

Known only from the type locality, Cerro de Paxtle, Puebla.

Shrub; leaves obovate or elliptic-oblong, 2 to 4 cm. long, 10 to 13 mm. wide, obtuse or subacute, coriaceous; peduncles 3 to 8 mm. long; perianth tube 8 mm. long, tomentulose, the lobes 2 mm. long; fruit 6 mm. long.

2. **Daphnopsis mollis** (Meisn.) Standl.

Daphnopsis bonplandii mollis Meisn. in DC. Prodr. **14**: 521. 1856.

San Luis Potosí and Veracruz; type from Papantla, Veracruz.

Shrub, 0.6 to 1 meter high; leaves oval or elliptic, 5 to 9 cm. long, 2.5 to 3.5 cm. wide, acute or obtuse at base and apex, glabrous on the upper surface; peduncles longer than the flowers; perianth tube 6 mm. long, the lobes 3 mm. long; fruit globose, glabrous, nearly 1 cm. in diameter.

3. **Daphnopsis lindenii** Meisn. in DC. Prodr. **14**: 522. 1856.

Type from Mirador, Veracruz, at 300 meters. Guatemala.

Leaves short-petiolate, obtuse or acute, reticulate-veined; peduncles slender, 12 to 16 mm. long, 6 to 10-flowered, the pedicels 4 to 5 mm. long; pistillate calyx 3 to 4 mm. long, tubular; ovary glabrous.

4. **Daphnopsis bonplandiana** (Kunth) Standl.

Daphne bonplandiana Kunth, Syn. Pl. Aequin. **1**: 447. 1822.

Hargasseria mexicana C. A. Meyer, Bull. Acad. St. Pétersb. Phys. Math. **1**: 358. 1843.

Hargasseria schiedeana Endl. Gen. Pl. Suppl. 4^2: 66. 1847.

Daphnopsis bonplandii Meisn. in DC. Prodr. **14**: 521. 1856.

Veracruz.

Tree; leaves oblong-obovate or oblanceolate, 7 to 13 cm. long, 2.5 to 3.5 cm. wide, obtuse or acute, coriaceous, attenuate at base; peduncles 1.5 to 3 cm. long, 8 to 16-flowered, the pedicels very short; staminate perianth 6 mm. long, densely sericeous.

5. **Dapnopsis salicifolia** (H. B. K.) Meisn. in DC. Prodr. **14**: 522. 1856.

Daphne salicifolia H. B. K. Nov. Gen. & Sp. **2**: 150. 1817.

Daphne maxicana Spreng. Syst. Veg. **2**: 236. 1825.

Morelos, the type from Cuernavaca; reported from Veracruz.

Shrub or tree, 1.5 to 6 meters high, ill-scented; leaves obtuse or acute, attenuate at base, nearly sessile, coriaceous, yellowish green when dry; umbels 8 to 20-flowered, the pedicels very short; staminate perianth 4 mm. long; fruit ovoid, 12 mm. long. "Hoja de San Pedro."

Reported by Sessé and Mociño [1] as *Daphne laureola*. They state that the bark and leaves are acrid, drastic, and corrosive. It is reported that the leaves are employed for blistering, like a mustard plaster.

6. **Daphnopsis cestrifolia** (H. B. K.) Meisn. in DC. Prodr. **14**: 523. 1856.

Daphne cestrifolia H. B. K. Nov. Gen. & Sp. **2**: 150. 1817.

Veracruz and Puebla. Type from Colombia.

Shrub, 1 to 3 meters high; leaves usually thin, obtuse or acute, attenuate at base, short-petiolate; peduncles 6 to 10-flowered, the pedicels very short; perianth 5 mm. long, sericeous; fruit ovoid-globose, red.

This, like *D. bonplandiana*, is closely related to *D. salicifolia*. With the scant material available, it is impossible to determine how many of the species listed here are really valid.

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[1] Pl. Nov. Hisp. 59. 1887.

118. LYTHRACEAE. Loosestrife Family.

REFERENCE: Koehne in Engl. Pflanzenreich IV. 216. 1903.

Trees, shrubs, or herbs; leaves opposite, whorled, or alternate, entire; stipules minute or none; flowers perfect, 4 to 16-parted, the pedicels usually bibracteolate; calyx tubular to campanulate, the lobes valvate, petals inserted in the throat of the calyx between the lobes; stamens inserted on the calyx tube; style simple or none, the stigma capitate; fruit capsular, dry.

Leaves black-dotted_____1. **ADENARIA.**
Leaves never black-dotted.
Calyx tubular, slighty curved or else spurred or gibbous at base.
2. PARSONSIA.
Calyx not tubular or, if so, neither curved nor gibbous at base.
Flowers 12 to 16-parted; calyx 3 cm. long._____3. **LAFOENSIA.**
Flowers 4 to 7-parted; calyx much less than 3 cm. long.
Calyx tubular_____4. **LYTHRUM.**
Calyx campanulate or broadly turbinate.
Stamens 8_____5. **LAWSONIA.**
Stamens 10 to 42.
Petals yellow; stamens 10 to 18_____6. **HEIMIA.**
Petals not yellow; stamens 28 to 42.
Petals on long slender claws, the blade cordate at base.
7. LAGERSTROEMIA.
Petals cuneate at base, not clawed_____8. **GINORIA.**

1. ADENARIA H. B. K. Nov. Gen. & Sp. 6: 185. 1823.

The following is the only species.

1. **Adenaria floribunda** H. B. K. Nov. Gen. & Sp. 6: 188. *pl. 549.* 1823.

Oaxaca. Central and South America.

Shrub or small tree, 1 to 6 meters high, covered everywhere with dotlike black glands; leaves opposite, nearly sessile, elliptic-lanceolate, 3 to 10 cm. long, acute or acuminate, puberulent beneath; flowers yellow, in short dense axillary cymes, 4 or 5-parted; calyx broadly turbinate, 3 to 4 mm. long, not appendaged; petals slightly exserted; stamens 7 to 12. "Chaparral" (Colombia); "guayabito" (Venezuela).

The sapwood is said to be light cream-colored or nearly white, the heartwood light yellow, turning darker or reddish on exposure, moderately soft and light, very fine-grained, and taking a good polish.

2. PARSONSIA Adans. Fam. Pl. 2: 234. 1763.

Shrubs or herbs; leaves opposite or ternate; flowers 6-parted, racemose or lateral, the pedicels axillary or interpetiolar; calyx tubular, often spurred at base; petals 6, 2, or none; stamens 11 or 9; ovary with a dorsal or cupuliform disk at base; fruit capsular, 1-celled, dehiscent along one side; seeds few or numerous.

Numerous herbaceous species occur in Mexico. Many of those listed below do not merit classification as shrubs, but others are truly woody. Some of the Brazilian species are reported to have sudorific, antisyphilitic, and diaphoretic properties. *P. petiolata* (L.) Rusby, of the United States, is said to resemble digitalis in its physiological action.

Bractlets none. Calyx 4 to 14 mm. long.
Two dorsal petals larger than the others----1. P. racemosa.
Two dorsal petals smaller than the others.
The 9 ventral stamens alternately unequal, 5 of them often subexserted.
Disk cuplike, investing the base of the ovary----2. P. gaumeri.
Disk large and investing part of the ovary base, interrupted dorsally.
3. P. ciliata.
The 9 ventral stamens not alternately unequal, included.
Disk cupuliform----4. P. utriculosa.
Disk dorsal----5. P. salicifolia.
Bractlets present on the pedicel, sometimes very small.
Calyx 3 to 11 mm. long; ovules 2 to 32.
Flowers opposite----6. P. epilobiifolia.
Flowers alternate.
Stamens in anthesis nearly or quite as long as the calyx.
7. P. hyssopifolia.
Stamens much shorter than the calyx----8. P. calophylla.
Calyx 12 to 40 mm. long or, if smaller, bialate within dorsally or the dorsal lobe produced; ovules sometimes as many as 50.
Calyx evidently bialate within, 10 to 24 mm. long, the spur usually subascending, rarely incurved.
Two interior wings of the calyx retrorse-hairy; petals 2.
Petals about 10 mm. long, dark purple; spur of calyx incurved.
9. P. nitidula.
Petals 2 to 3.5 mm. long, violet-black; spur straight or subascending----10. P. cyanea.
Two interior wings of calyx glabrous; petals usually 6, rarely 2.
Pedicels axillary; petioles up to 17 mm. long----11. P. nudicostata.
Pedicels interpetiolar; petioles less than 12 mm. long.
Leaves 10 to 12 mm. long, glabrous on the upper surface.
12. P. empetrifolia.
Leaves mostly more than 2 cm. long, usually scabrous or pubescent on the upper surface.
Ventral petals about half as long as the 2 dorsal ones.
13. P. pinetorum.
Ventral petals 3 mm. long or less, or absent, much less than half as long as the dorsal petals.
Flowers not in distinct racemes, the pedicels interpetiolar.
14. P. chiapensis.
Flowers in distinct racemes.
Branches glandular-hirsute; petioles 1 to 2 mm. long.
15. P. ixodes.
Branches retrorse-scabrous or puberulent, glandular-hirtellous only in the inflorescence; petioles usually 8 to 12 mm. long----16. P. hookeriana.
Calyx not bialate within, sometimes slightly bicostate.
Dorsal lobe of the calyx large, produced; calyx usually violet or purplish, never scarlet. Petals usually 6.
Scales absent below the petals.
Petals 2----17. P. llavea.
Petals 6.
Calyx 25 to 28 mm. long----18. P. blepharophylla.
Calyx 15 to 20 mm. long.
Calyx hirsute with eglandular hairs----19. P. bilimekii.
Calyx minutely glandular-hirtellous----20. P. goldmanii.

Scale present below each dorsal petal.
Four ventral petals very obtuse at base and apex; longer stamens equaling the calyx lobes_____21. P. arnottiana.
Four ventral petals cuneate at base, acute or obtuse at apex; longer stamens slightly exceeding the calyx lobes.
Leaves rounded or subcordate at base; pedicels mostly 2 to 4 mm. long_____22. P. lobophora.
Leaves acute or obtuse at base; pedicels mostly 5 to 10 mm. long_____23. P. squamuligera.
Dorsal lobe of the calyx not produced or, if so, the calyx scarlet.
Calyx slender or very slender, the dorsal lobe usually broad but shorter than the others, the mouth of the calyx oblique.
Petals 6, subequal_____24. P. aequipetala.
Petals 2, or 6 but very unequal.
Stamens 9; ovules 12 to 23; spur of calyx strongly incurved. 25. P. bustamanta.
Stamens 11; ovules 3 to 11; spur obsolete or, if evident, never incurved.
Flowers solitary, not racemose_____26. P. appendiculata.
Flowers in evident terminal racemes.
Calyx spurred at base_____27. P. roseana.
Calyx not spurred, merely gibbous at base.
Calyx glabrous within at base.
Leaves setose-hirsute on the upper surface. 28. P. megalophylla.
Leaves merely scaberulous on the upper surface. 29. P. cristata.
Calyx hairy within at base.
Appendages of calyx shorter than the lobes; calyx hirtellous _____30. P. graciliflora.
Appendages longer than the lobes; calyx minutely strigillose _____31. P. boissieriana.
Calyx thick and stout, convex dorsally, the lobes usually very short or none.
Ovules 48 to 100.
Petals included_____32. P. micropetala.
Petals, at least the 2 dorsal ones, exserted, nearly half as long as the calyx_____33. P. heteropetala.
Ovules 4 to 26.
Appendages of the calyx longer than the lobes, bulbous-ciliate at base.
Ovules 8; stems not hirsute_____34. P. schumannii.
Ovules 4; stems hirsute_____35. P. bracteolosa.
Appendages obsolete or shorter than the lobes or, if longer, never bulbous-ciliate.
Calyx lobes eciliate_____36. P. baillonis.
Calyx lobes ciliate.
Petals evident, 2 mm. long or much longer.
Petals, at least the 4 ventral ones, very small.
Petals very unequal, the 2 dorsal ones about half as long as the calyx, the 4 ventral ones half as long and much narrower_____37. P. heterophylla.
Petals subequal, about 2 mm. long____38. P. jorullensis.

Petals all large and of equal length, the ventral ones narrower than the dorsal.
Dorsal petals rounded-obovate; ovules about 15; leaves opposite——39. **P. intermedia.**
Dorsal petals narrowly obovate; ovules 5; leaves ternate or scattered——40. **P. retroscabra.**
Petals none or minute and subulate.
Spur of the calyx very short, not compressed at base. 41. **P. watsoniana.**
Spur orbicular, compressed at base.
Inflorescence distinctly racemose, the flowers fasciculate.
Axis of the inflorescence pubescent and often sparsely hispidulous; petals 6——42. **P. subuligera.**
Axis of the inflorescence densely glandular-hirtellous; petals none——43. **P. caeciliae.**
Inflorescence leafy, the flowers solitary in the axils.
Plant glabrous——44. **P. ignea.**
Plant hirtellous or hispidulous——45. **P. liebmannii.**

1. **Parsonsia racemosa** (L. f.) Standl.

Lythrum racemosum L. f. Suppl. Pl. 250. 1781.
Cuphea spicata Cav. Icon. Pl. 4: 56. *pl. 381.* 1797.
Cuphea racemosa Spreng. Syst. Veg. 2: 455. 1825.

Veracruz and Oaxaca. West Indies and South America.

Plants herbaceous or suffrutescent, viscid, hirsute; leaves ovate or ovate-elliptic, 2 to 5 cm. long, acute or obtuse; flowers in naked racemes, the pedicels 3 to 6 mm. long; calyx 5.5 to 10 mm. long, short-hirtellous; petals pink, about half as long as the calyx. "Hierba del fraile" (Colombia).

2. **Parsonsia gaumeri** (Koehne) Standl.

Cuphea gaumeri Koehne, Bot. Jahrb. Engler 29: 154. 1900.

Yucatán; type from Buena Vista Xbac.

Stems herbaceous or suffrutescent, glandular-pubescent; leaves subsessile, oblong to elliptic, 1 to 2 cm. long, obtuse or acute, obscurely ciliolate; flowers chiefly axillary, the pedicels 3 to 5 mm. long; calyx 6.5 mm. long, hirtellous on the nerves.

Reported by Millspaugh[1] as *Cuphea trinitatis* DC.

3. **Parsonsia ciliata** (Swartz) Standl.

Lythrum ciliatum Swartz, Prodr. Veg. Ind. Occ. 76. 1788.
Cuphea decandra Ait. Hort. Kew. ed. 2. 3: 151. 1811.
Cuphea ciliata Koehne, Bot. Jahrb. Engler 1: 454. 1881.
Cuphea purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 378. 1913.

Veracruz. Cuba, Haiti, and Colombia.

Slender shrub, much branched; petioles 1 to 3 mm. long; leaves oblong, obovate, or ovate, 1.5 to 5 cm. long, cuneate or attenuate at base, acute or obtuse at apex, glandular-ciliate; flowers racemose, the pedicels 2 to 5 mm. long; calyx green, 7 to 11 mm. long, glandular-hirtellous; petals purple, the ventral ones 4 to 5.5 mm. long.

4. **Parsonsia utriculosa** (Koehne) Standl.

Cuphea utriculosa Koehne in Mart. Fl. Bras. 13[2]: 452. 1877.

Tepic to Chiapas and Tabasco. Central America.

Slender shrub, the stems glandular-hirtellous or glabrate; leaves sessile or subsessile, 1 to 3.5 cm. long, oblong-lanceolate to linear, glabrous but often

[1]Field Mus. Bot. 1: 311. 1896.

ciliate; racemes leafy, the pedicels 5 to 12 mm. long; calyx 4 to 7 mm. long, green, glabrous; petals pink or purple, the ventral ones 3 to 4 mm. long.

Specimens from Tepic are noteworthy because of their broad leaves, and may represent a distinct species.

5. Parsonsia salicifolia (Schlecht. & Cham.) Standl.

Cuphea salicifolia Schlecht. & Cham. Linnaea 5: 569. 1830.

In wet soil, Veracruz and Oaxaca; type collected near Misantla and Papantla, Veracruz.

Slender shrub, 1 meter high or less, glabrous; leaves oblanceolate or linear-oblanceolate, 3 to 12 cm. long, obtuse, attenuate at base; flowers in slender racemes, the pedicels 5 to 11 mm. long; calyx green, 6 to 9 mm. long; petals purple, the ventral ones 4 to 5 mm. long. "Xoniguilli."

6. Parsonsia epilobiifolia (Koehne) Standl.

Cuphea epilobiifolia Koehne in Mart. Fl. Bras. 13^2: 223. 1877.

Oaxaca. Costa Rica and Venezuela.

Shrub, 1.3 meters high or less, the branches canescent-puberulent; leaves subsessile, narrowly lanceolate, 4.5 to 9 cm. long, attenuate to each end, strigillose or glabrate beneath, pale; racemes long and slender, the pedicels 2 to 5 mm. long; calyx green, 6 to 9 mm. long, canescent-hirtellous; petals purple.

7. Parsonsia hyssopifolia (H. B. K.) Standl.

Cuphea hyssopifolia H. B. K. Nov. Gen. & Sp. 6: 199. 1823.

Sinaloa to San Luis Potosí, Veracruz, Tabasco, and Chiapas; type from Jalapa, Veracruz. Guatemala.

Slender shrub, 30 to 60 cm. high, often much branched, the branches appressed-hispidulous, densely leafy; leaves subsessile, linear to lanceolate or oblong, 1 to 3 cm. long, glabrous or nearly so; flowers axillary, the pedicels 3 to 7 mm. long; calyx green, 5.5 to 8 mm. long, glabrous or aculeolate-hispidulous; petals purple, pink, or white.

8. Parsonsia calophylla (Cham. & Schlecht.) Standl.

Cuphea calophylla Cham. & Schlecht. Linnaea 2: 361. 1827.

Cuphea orthodisca Koehne in Mart. Fl. Bras. 13^2: 224. 1877.

Oaxaca. Central America to Brazil.

Plants 30 to 100 cm. high, woody at base, the stems hispid or pilose; leaves subsessile, 1 to 5 cm. long, oblong, oblanceolate, or obovate, obtuse, ciliate and hispidulous; racemes leafy, the pedicels 2 to 6 mm. long; calyx green, 6 mm. long, viscid-hirtellous.

The Mexican form is *Cuphea calophylla orthodisca* Koehne.[1]

9. Parsonsia nitidula (H. B. K.) Standl.

Cuphea nitidula H. B. K. Nov. Gen. & Sp. 6: 162. 1823.

Veracruz; type from Jalapa.

Shrub, sometimes 4.5 meters high; petioles 1 to 9 mm. long; leaves lanceolate to broadly ovate, 2 to 10 cm. long, acute or acuminate, obtuse to subcordate at base, strigose or hirtellous beneath; inflorescence leafy, the pedicels 5 to 13 mm. long; calyx 15 to 24 mm. long, green or purplish; petals purple.

10. Parsonsia cyanea (DC.) Standl.

Cuphea cyanea DC. Prodr. 3: 85. 1828.

Cuphea coccinea DC. Prodr. 3: 85. 1828.

Cuphea pubiflora Benth. Pl. Hartw. 61. 1840.

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[1] Bot. Jahrb. Engler 2: 138. 1881.

Cuphea strigulosa Lemaire, Fl. Gewächshäus. 1: 87. 1845.
Cuphea strigillosa Lindl. Bot. Reg. 32: *pl. 4.* 1846.
Coahuila to Guerrero, Chiapas, and Veracruz.

Plants suffrutescent at base, sometimes 2 meters high, the branches pubescent and glandular-hirtellous or glabrate; petioles 5 to 30 mm. long; leaves ovate or broadly ovate, 1.5 to 9 cm. long, acute or acuminate, rounded at base, strigulose or sparsely pilosulous; racemes often naked and paniculate, the pedicels 2.5 to 10 mm. long; calyx 16 to 23 mm. long, viscid-hirtellous, red, yellow, and green.

This species has been introduced into cultivation in Europe and the United States.

11. Parsonsia nudicostata (Hemsl.) Standl.

Cuphea nudicostata Hemsl. Diag. Pl. Mex. 52. 1880.
Known only from the type locality, "Ciudad Real."

Stems covered with long purple glandular-setose hairs; leaves lance-oblong, 5.5 to 7.5 cm. long, acute, strigose and hispidulous; calyx 25 mm. long, glandular-pilose; 2 dorsal petals 10 to 13 mm. long.

12. Parsonsia empetrifolia (Rose) Standl.

Cuphea empetrifolia Rose, Contr. U. S. Nat. Herb. 5: 137. 1897.
Known only from the type locality, Chilpancingo, Guerrero, altitude 2,650 to 3,000 meters.

Slender shrub, the branches puberulent or hirtellous; leaves subsessile, linear or oblong, obtuse or acute, lustrous above; flowers in distinct racemes; calyx 15 mm. long, purplish, glandular-hispidulous; petals purple, the 2 dorsal ones 8 mm. long.

13. Parsonsia pinetorum (Benth.) Standl.

Cuphea pinetorum Benth. Pl. Hartw. 74. 1841.
Veracruz and Chiapas. Guatemala; type from San Ramón.

Slender shrub, the branches puberulent-scabrous; leaves subsessile, lanceolate, 2.5 to 7 cm. long, attenuate, obtuse to subcordate at base, scabrous; racemes leafy, the pedicels 4 to 7 mm. long; calyx 17 to 20 mm. long, viscid-hirtellous, not colored; petals black-purple.

14. Parsonsia chiapensis (T. S. Brandeg.) Standl.

Cuphea chiapensis T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 187. 1915.
Known only from the type locality, Cerro del Boquerón, Chiapas.

Shrub, the branches viscid-hirtellous; petioles 7 to 15 mm. long; leaves ovate, 2 to 5.5 cm. long, acuminate, rounded at base, scabrous; calyx about 23 mm. long, hirtellous; 2 dorsal petals 12 mm. long, red.

15. Parsonsia ixodes (Hemsl.) Standl.

Cuphea ixodes Hemsl. Diag. Pl. Mex. 52. 1880.
Described from southern Mexico, the locality not known.

Petioles 1 to 2 mm. long; leaves ovate-lanceolate, 2.5 to 5 cm. long, scabrous and hirtellous; pedicels 6 to 10 mm. long; calyx 20 to 25 mm. long, glandular-hispidulous; 2 dorsal petals 8 to 9 mm. long.

16. Parsonsia hookeriana (Walp.) Standl.

Cuphea floribunda Hook. & Arn. Bot. Beechey Voy. 289. 1841. Not *C. floribunda* Lehm. 1831.
Cuphea hookeriana Walp. Repert. Bot. 2: 107. 1843.
Cuphea cinnabarina Planch. Fl. Serr. Jard. 5: *pl. 527.* 1849.
Cuphea roezlii Carrière, Rev. Hort. 1877: 469. 1877.
Cuphea pringlei S. Wats. Proc. Amer. Acad. 25: 149. 1890.

Sinaloa to Veracruz and Chiapas; type collected between San Blas and Tepic. Guatemala and Nicaragua.

Plants usually shrubby, sometimes 2 meters high; leaves lanceolate or ovate, 2 to 11 cm. long, acuminate; pedicels 2 to 9 mm. long; calyx 10 to 22 mm. long, bright red, viscid-pubescent; petals purple.

17. Parsonsia llavea (Lex.) Standl.

Cuphea llavea Lex.; Llave & Lex. Nov. Veg. Descr. 1: 20. 1824.

Cuphea barbigera Hook. & Arn. Bot. Beechey Voy. 289. 1841.

Cuphea miniata Brongn. in Van Houtte, Fl. Gewächschäus. 2: *pl. 9.* 1846.

Chihuahua to Sinaloa, Zacatecas, and Oaxaca.

Shrub, the branches strigose or hirtellous; leaves subsessile, lanceolate or ovate, 2 to 8 cm. long. acute or acuminate, obtuse to subcordate at base, scabrous; pedicels 2 to 4 mm. long, the racemes leafy; calyx 20 to 40 mm. long, green or purplish, grayish-hirsute; petals bright red. "Hierba de San Pedro" (*Koehne*).

Forms of this species are frequently cultivated, and hybrids between this and other species have been produced in European gardens.

18. Parsonsia blepharophylla Blake, Proc. Biol. Soc. Washington 32: 190. 1919.

Known only from the type locality. between Ixtagua and Agua Fría, Sinaloa.

Leaves short-petiolate, lanceolate to oblong-ovate, 2 to 4 cm. long or larger, acute, or acuminate, rounded or obtuse at base, very scabrous; calyx hirsute with eglandular hairs, purplish; petals bright red.

19. Parsonsia bilimekii (Koehne) Standl.

Cuphea bilimekii Koehne in Engl. Pflanzenreich IV. 216: 155. 1903.

Known only from the type locality, Orizaba, Veracruz.

Branches pubescent and hirsute; leaves subsessile, ovate-oblong, 2 to 3 cm. long, acute, rounded at base; racemes short, leafy, the pedicels 2 to 3 mm. long; calyx purplish; petals purple.

20. Parsonsia goldmanii (Rose) Standl.

Cuphea goldmanii Rose, Contr. U. S. Nat. Herb. 12: 287. *f. 28.* 1909.

Known only from the type locality, Comitán, Chiapas.

Shrub, 1 to 2 meters high; leaves elliptic or oval-ovate, 2 to 4 cm. long, obtuse or subacute, rounded at base, scabrous above, hirtellous beneath, short-petiolate; calyx green; petals dark red.

21. Parsonsia arnottiana Standl.

Cuphea bracteata Hook. & Arn. Bot. Beechey Voy. 289. 1841. Not *C. bracteata* Lag. 1814.

Jalisco and Tepic; type from San Blas and Tepic.

Leaves subsessile, oblong or ovate, 10 to 15 mm. long, acute, strigose-hirtellous; pedicels 4 mm. long; calyx 10 to 12 mm. long, short-hirtellous and setulose; dorsal petals 7 mm. long, purple.

22. Parsonsia lobophora (Koehne) Standl.

Cuphea lobophora Koehne in Mart. Fl. Bras. 13^2: 235. 1877.

Sinaloa and Jalisco to Morelos and Oaxaca; type from Oaxaca.

Plants woody at base, 60 cm. high or less; leaves sessile, linear to oblong ovate, 2 to 5 cm. long, acute; calyx green or purplish, hirtellous or scabrous.

23. Parsonsia squamuligera (Koehne) Standl.

Cuphea squamuligera Koehne in Mart. Fl. Bras. 13^2: 235. 1877.

Guerrero, Michoacán, Morelos, and Mexico; type from Morelia, Michoacán.

Plants usually suffrutescent at base; leaves subsessile, lanceolate or oblong-ovate, 2 to 5 cm. long, acute; calyx green or purplish, hirtellous or scabrous.

24. Parsonsia aequipetala (Cav.) Standl.

Cuphea aequipetala Cav. Icon. Pl. 4: 57. *pl. 382, f. 2.* 1797.
Cuphea bracteata Lag. Nov. Gen. & Sp. 16. 1814.
Cuphea scabrida H. B. K. Nov. Gen. & Sp. 6: 203. 1823.
Cuphea apanxaloa DC. Prodr. 3: 88. 1828.
Cuphea floribunda Lehm. Linnaea 6: Lit. 11. 1831.
Cuphea violacea Regel, Flora 33: 354. 1850.
Cuphea oeymoides Decaisne, Journ. d'Hort. 3: *pl. 3.* 1859.

Coahuila to Michoacán, Chiapas, and Veracruz. Guatemala.

Plants a meter high or less, herbaceous or suffrutescent; petioles 5 mm. long or less; leaves lanceolate or ovate, 2 to 5 cm. long, acute, acute to rounded at base, glabrous or hispidulous beneath; inflorescence leafy, the pedicels 1 to 5 mm. long; calyx 13 to 23 mm. long, purplish; petals violet or purple. "Apancholoa" (Veracruz).

25. Parsonsia bustamanta (Llave & Lex.) Standl.

Cuphea bustamanta Llave & Lex. Nov. Veg. Descr. 1: 21. 1824.
Cuphea platycentra Benth. Pl. Hartw. 7. 1839.

Michoacán to Mexico, Morelos, and Oaxaca; type from Morelia, Michoacán.

Stems herbaceous or suffrutescent, strigose-puberulent; petioles 4 to 10 mm. long; leaves ovate or rounded-ovate, 2 to 5 cm. long, scaberulous or hispidulous; calyx 22 to 25 mm. long, red, puberulent or hispidulous; petals yellow, or the dorsal ones purple.

26. Parsonsia appendiculata (Benth.) Standl.

Cuphea appendieulata Benth. Pl. Hartw. 61. 1840.

Oaxaca and Chiapas; type from Juquila, Oaxaca.

Shrub, 2 meters high or less, the branches hispidulous; leaves lance-elliptic, 5 to 12 cm. long, acuminate, attenuate at base to a short petiole, hispidulous beneath along the nerves; calyx 25 to 33 mm. long, green, strigillose; petals red-purple, 5 to 9 mm. long.

27. Parsonsia roseana (Koehne) Standl.

Cuphea trichopetala Rose, Contr. U. S. Nat. Herb. 9: 261. 1900. Not *C. trichopetala* Rusby & Koehne, 1896.
Cuphea roseana Koehne, Bot. Jahrb. Engler 29: 261. 1900.

Known only from the type locality, near Colomas, Sinaloa.

Stems suffrutescent at base, puberulent or glabrous; leaves sessile, oblong-obovate, 5 to 14 cm. long, acute or acuminate, narrowed to the clasping base, densely scaberulous beneath; calyx 16 to 23 mm. long, green, setose-hirsute; dorsal petals dark purple-red, 7 mm. long, the ventral petals filiform, spirally contorted above.

28. Parsonsia megalophylla (Blake) Standl.

Cuphea megalophylla Blake, Contr. Gray Herb. n. ser. 53: 63. 1918.

Known only from the type locality, Cafetal Concordia, Pochutla, Oaxaca, altitude 500 meters.

Stems densely hispidulous and setose-pilose; leaves oval, 10 to 14 cm. long, acuminate, cuneate-acuminate at base, minutely tuberculate-hispidulous beneath; calyx 27 mm. long, greenish, setose-pilose with purple hairs.

29. Parsonsia cristata (Rose) Standl.

Cuphea cristata Rose, Contr. U. S. Nat. Herb. 5: 196. *pl. 23.* 1899.

Tepic and Michoacán or Guerrero; type collected between Tepic and Pedro Paulo.

Stems suffrutescent at base, strigillose; leaves petiolate, elliptic or elliptic-lanceolate, 7 to 12 cm. long, acuminate, abruptly attenuate at base, scaberulous beneath; calyx about 30 mm. long, red and green, setose-hirsute; petals red, narrowly oblong.

30. Parsonsia graciliflora (Koehne) Standl.

Cuphea graciliflora Koehne in Mart. Fl. Bras. 13²: 236. 1877.

Veracruz, Oaxaca, and Chiapas.

Plants usually suffrutescent, the stems densely hisp'd or hirsute; leaves petiolate or subsessile, ovate or elliptic, 4 to 18 cm. long, acute or acuminate, acute or obtuse at base, thick, hispidulous beneath; inflorescence racemose-paniculate, many-flowered; calyx 24 to 30 mm. long, hirtellous or hirsute, green or purplish; petals bright red.

31. Parsonsia boissieriana (Koehne) Standl.

Cuphea boissieriana Koehne, Bot. Jahrb. Engler 7: 42. 1885.

Type from Mexico, the locality not known.

Branches strigillose-scabrous and sparsely pilose; leaves sessile, lanceolate, 3.5 to 7 cm. long, scaberulous; pedicels 1 to 2 mm. long; calyx 25 mm. long, red.

32. Parsonsia micropetala (H. B. K.) Standl.

Cuphea micropetala H. B. K. Nov. Gen. & Sp. 6: 209. *pl. 551.* 1823.

Cuphea eminens Planch. & Lind. Fl. Serres 10: *pl. 994.* 1854.

Colima to Morelos and Oaxaca; type from Guanajuato.

Plants shrubby or herbaceous, 1 meter high or less, the stems puberulent and sometimes hirtellous; petioles 10 mm. long or less; leaves oblong-lanceolate or narrowly lanceolate, 5 to 16 cm. long, attenuate at each end, scaberulous; calyx 20 to 35 mm. long, red and yellow; stamens often exserted.

33. Parsonsia heteropetala (Koehne) Standl.

Cuphea heteropetala Koehne in Mart. Fl. Bras. 13²: 232. 1877.

Oaxaca.

Branches glandular-hirtellous or hispidulous; leaves petiolate or subsessile, lanceolate or linear-lanceolate, glabrous, 2.5 to 10 cm. long; pedicels 7 to 11 mm. long; calyx 21 to 25 mm. long, glandular-hirtellous.

34. Parsonsia schumannii (Koehne) Standl.

Cuphea schumannii Koehne, Bot. Jahrb. Engler 29: 160. 1900.

Type from Córdoba, Veracruz.

Stems biseriately glandular-setose; petioles 15 mm. long or less; leaves 7.5 to 9.5 cm. long, acute, acute to subcordate at base, scabrous above; pedicels 3 mm. long or less; calyx 23 to 25 mm. long, red.

35. Parsonsia bracteolosa (Koehne) Standl.

Cuphea bracteolosa Koehne, Bot. Jahrb. Engler 41: 95. 1907.

Known only from the type locality, La Tuveria, Michoacán or Guerrero, altitude 900 meters.

Stems suffrutescent, 60 cm. high, strigose and hirsute; leaves ternate, subsessile, lanceolate, 3 to 6 cm. long, acuminate, rounded at base, glabrous beneath, scabrous above; pedicels axillary, 4 to 7 mm. long; calyx about 20 mm. long, red, hirsute; petals black-purple, 3 mm. long.

36. Parsonsia baillonis (Koehne) Standl.

Cuphea baillonis Koehne, Bot. Jahrb. Engler 4: 401. 1833.

Type from Oaxaca.

Stems sparsely pubescent below; petioles 1 to 2 mm. long; leaves opposite, 3.5 to 5 cm. long, acute, rounded or obtuse at base, scabrous above, glabrous beneath; racemes leafy, the pedicels 8 to 10 mm. long; calyx 20 to 22 mm. long, red.

37. Parsonsia heterophylla (Benth.) Standl.

Cuphea heterophylla Benth. Pl. Hartw. 37. 1840.

Cuphea terna Peyritsch, Linnaea 30: 71. 1857.

Cuphea propinqua Hemsl. Diag. Pl. Mex. 53. 1880.

Michoacán to Mexico, Morelos, and Oaxaca; perhaps also in Tepic; type from Morelia, Michoacán.

Stems herbaceous or suffrutescent, 60 cm. high or less, hirsute, pubescent, or glabrous; petioles 3 mm. long or less; leaves mostly ternate, ovate to oblong-lanceolate, 3 to 10 cm. long. scabrous; racemes distinct, leafy or nearly naked, the pedicels 4 to 20 mm. long; calyx 15 to 25 mm. long, purplish or reddish, puberulent or short-hirsute; petals red. "Moradilla" (*Koehne*).

38. Parsonsia jorullensis (H. B. K.) Standl.

Cuphea jorullensis H. B. K. Nov. Gen. & Sp. 6: 208. 1823.

Cuphea arvensis Benth. Pl. Hartw. 37. 1840.

Cuphea viridostoma S. Wats. Proc. Amer. Acad. 22: 412. 1887.

Cuphea mesochloa Greene, Pittonia 1: 141. 1887.

Durango to Morelos and Oaxaca; type from Jorullo, Michoacán.

Stems herbaceous or suffrutescent, 80 cm. high or less, puberulent and hispidulous; petioles 1 to 5 mm. long; leaves mostly opposite, oblong, lanceolate, or ovate, 2 to 6 cm. long, obtuse or acute, very scabrous; flowers in distinct racemes, the pedicels 5 to 20 mm. long; calyx 20 to 28 mm. long, red and green; petals whitish.

39. Parsonsia intermedia (Hemsl.) Standl.

Cuphea intermedia Hemsl. Diag. Pl. Mex. 52. 1880.

Type from Chiapas.

Stems puberulent when young; leaves short-petiolate, ovate-lanceolate or ovate, 3 to 4 cm. long, acute or obtuse, scabrous above and sparsely pilose, pubescent and scaberulous beneath; flowers solitary; calyx 25 mm. long, hirtellous-pubescent; petals purple or pink.

40. Parsonsia retroscabra (S. Wats.) Standl.

Cuphea retroscabra S. Wats. Proc. Amer. Acad. 22: 413. 1887.

Jalisco, the type from Río Blanco.

Stems herbaceous or suffrutescent at base, hispidulous and retrorse-scabrous; leaves mostly ternate, oval to oblong-linear, 2 to 3 cm. long, obtuse or acute, scabrous; flowers in distinct racemes, the pedicels 6 to 20 mm. long; calyx about 16 mm. long, purplish, puberulent and hispidulous; petals pink.

41. Parsonsia watsoniana (Koehne) Standl.

Cuphea watsoniana Koehne, Bot. Jahrb. Engler 23: Beibl. 57: 29. 1897.

Known only from the type locality, Lake Chapala, Jalisco.

Stems suffrutescent, scaberulous and hispid; petioles 2 to 5 mm. long; leaves ovate-lanceolate or oblong-lanceolate, 3 to 6.5 cm. long, acute, very scabrous; flowers lateral, the pedicels 4 to 7 mm. long; calyx 25 to 30 mm. long, red.

42. Parsonsia subuligera (Koehne) Standl.

Cuphea subuligera Koehne in Mart. Fl. Bras. **13²**: 231. 1877.

Cuphea dodecandra Hemsl. Diag. Pl. Mex. 51. 1880.

Puebla and Chiapas.

Stems suffrutescent, glabrous; leaves short-petiolate, lance-ovate to oblong-lanceolate, 4 to 10 cm. long, long-acuminate, glabrous and smooth; flowers in distinct racemes, the pedicels 3 to 11 mm. long; calyx 23 to 28 mm. long, pink or purple, glabrate.

43. Parsonsia caeciliae (Koehne) Standl.

Cuphea caeciliae Koehne, Bull. Herb. Boiss. **7**: 564. 1899.

Known only from the type locality, Río Saconeja, Chiapas.

Similar to *P. subuligera;* leaves wider; calyx 20 to 30 mm. long, purple-red, densely glandular-hirtellous.

44. Parsonsia ignea (A. DC.) Standl.

Cuphea platycentra Lem. Fl. Gewächshäus. **2**: *pl. 180*. 1846. Not *C. platycentra* Benth. 1839.

Cuphea ignea A. DC. Fl. Serr. Jard. **3**: 500C. 1849.

Veracruz, Oaxaca, and Chiapas. Jamaica.

Stems suffrutescent 1 meter high or less, glabrous; leaves short-petiolate, lanceolate or ovate, 2 to 8.5 cm. long, acuminate, glabrous; pedicels 5 to 20 mm. long; calyx 18 to 25 mm. long, bright red.

45. Parsonsia liebmannii (Koehne) Standl.

Cuphea liebmannii Koehne in Mart. Fl. Bras. **13²**: 231. 1877.

Type from Tolontepec.

Similar to *P. ignea*; stem, leaves, and calyx pilose with spreading hairs; calyx 17 mm. long.

3. LAFOENSIA Vand. Fl. Lusit. Bras. 33. 1788.

The other species are natives of South America.

1. Lafoensia punicaefolia DC. Mém. Soc. Phys. Hist. Nat. Genève **3²**: 86. *pl. 1.* 1826.

Guerrero and Oaxaca, at altitudes of 300 to 450 meters. Central America to Bolivia and Venezuela; type from Santa Marta, Colombia.

Tree, 16 meters high or less, the bark dark brown; leaves opposite, short-petiolate, oblong-lanceolate, 5 to 11 cm. long, obtuse-acuminate, glabrous, with a conspicuous pore beneath just below the apex; flowers racemose or subpaniculate, 12 to 16-parted; calyx campanulate, 3 cm. long, very thick and leathery; petals 3 to 3.5 cm. long, pale yellow, turning red in age; stamens several times as long as the calyx, the filaments red; fruit an ovoid capsule, 3 cm. long or larger; wood rather hard, heavy, strong, tough, fine-grained, taking a good polish, the sapwood pale yellow, the heartwood slightly darker. "Coquito" (Oaxaca); "moreno" (Guerrero); "palo culebra," "palo de culebra" (Guatemala); "amarillo" (Panama); "trompillo," "cuyapo" (El Salvador).

A fine yellow dye is obtained from the tree in Guerrero and Panama. In El Salvador it is often planted for shade.

4. LYTHRUM L. Sp. Pl. 446. 1753.

Plants herbaceous or sometimes frutescent, slender, glabrous, growing in wet soil; leaves opposite in the species here listed, sometimes alternate, narrow; flowers axillary, solitary, 4 to 6-parted; calyx tubular, with small appendages; petals white, pink, or purple; capsule bivalvate.

Several herbaceous species occur in Mexico. The two listed here scarcely deserve mention, but they are usually somewhat woody at base.

Leaves short-petiolate, obtuse or rounded at base_____1. **L. acinifolium.**
Leaves, at least the upper ones, sessile and cordate at base____2. **L. gracile.**

1. Lythrum acinifolium Koehne, Bot. Jahrb. Engler 1: 322. 1881.

Durango to San Luis Potosí, Veracruz, Puebla, and Chiapas. Guatemala and Chile.

Plants very slender, much branched, sometimes 2 meters high, the stems brown, with exfoliating bark; leaves oblong to elliptic-ovate, 5 to 30 mm. long, obtuse; calyx 4 to 6 mm. long; petals purple or white.

2. Lythrum gracile Benth. Pl. Hartw. 7. 1839.

Nuevo León to Jalisco and Veracruz; type from Zacatecas.

Plants usually less than 60 cm. high, much branched; leaves cordate-oblong or ovate, 5 to 13 mm. long, acute or obtuse; calyx 4 to 5 mm. long.

5. LAWSONIA L. Sp. Pl. 349. 1753.

The genus consists of a single species.

1. Lawsonia inermis L. Sp. Pl. 349. 1753.

Lawsonia alba Lam. Encycl. 3: 106. 1789.

Cultivated in many parts of Mexico, and in places growing without cultivation. Native probably of Africa and Asia, but commonly cultivated in most tropical and subtropical regions.

Shrub or tree, 2 to 6 meters high, glabrous, the branchlets often spinelike; leaves opposite, oblong or obovate, 1 to 2.5 cm. long, mucronate-acuminate, narrowed at base; flowers 4-parted, in large open terminal panicles, sweet-scented; calyx broadly turbinate, 3 to 5 mm. long; petals yellow, reniform, nearly sessile; stamens 8; fruit globose, 2 to 4-celled, indehiscent. "Reseda" (Sinaloa, Tamaulipas, El Salvador, Nicaragua, Costa Rica, Colombia, Porto Rico); "cinamomo" (Philippines).

The henna plant is cultivated in tropical America for its sweet-scented flowers. It grows readily from cuttings and makes a good hedge plant, somewhat resembling privet. The odor of the flowers is strong and resembles that of mignonette. The leaves of henna are much used in the Orient for staining the nails, hands, and feet yellow, and also for dyeing the hair and beard. A paste of the leaves applied to the hair or beard soon produces a bright red color, which is considered becoming among certain classes of Mohammedans. Frequently, however, an indigo paste is next applied, and this turns the hair jet black. The tails and manes of horses are sometimes colored red in the same way. From the flowers is obtained a perfume which becomes an ingredient of oils and ointments, and was employed by the Egyptians in embalming; also by the Jews in baths and in religious ceremonies (it is the "camphire" of Solomon). The plant yields a dull red dye for cloth. The fruit is reputed to have emmenagogue properties and the leaves are used internally and externally for jaundice, leprosy, and various cutaneous affections.

6. HEIMIA Link, Enum. Pl. 2: 3. 1822.

Only one other species is known, a native of South America.

1. Heimia salicifolia (H. B. K.) Link, Enum. Pl. 2: 3. 1822.

Nesaea salicifolia H. B. K. Nov. Gen. & Sp. 6: 192. 1823.

Heimia syphilitica DC. Mém. Soc. Phys. Hist. Nat. Genève 3^2: 12. 1826.

Nesaea syphilitica Steud. Flora 25: 474. 1842.

Along streams or in wet soil, Baja California to Coahuila, Veracruz, and Oaxaca. Western Texas, El Salvador, Jamaica, and South America.

Shrub, 0.5 to 3 meters high, glabrous; leaves mostly opposite, sessile, linear-lanceolate or lanceolate, 2 to 9 cm. long, acuminate; flowers yellow, inodorous, pedicellate, solitary in the axils; calyx campanulate, 5 to 9 mm. long, with hornlike appendages at base of lobes; petals 5 to 7, 12 to 17 mm. long; stamens 10 to 18. "Hauchinal," "hauchinol," "hauchinoli," "hachinal," "huauchinal," "hanchinol," "hanchinoli," "hanchinal," (Oaxaca, Morelos, Mexico, and elsewhere); "jarilla" (Oaxaca); "sinicuiche," "sinicuilche," "sinicuil" (Nuevo León, Jalisco); "granadillo" (*Urbina*); "escobilla del río" (Tamaulipas); "quiebra yugo," "quiebra arado" (Argentina, Uruguay).

The petals fall soon after the flowers open. The plant is much used locally in medicine, emetic, antisyphilitic, hemostatic, febrifuge, diuretic, laxative, vulnerary, sudorific, tonic and astringent properties being ascribed to it. It is employed most commonly for syphilitic affections. The leaves are said to contain 9 per cent of a bitter principle, nesine, and about 14 per cent of a resin, the latter being the active principle. If the juice or a decoction of the plant is taken internally it is said to produce a mild and pleasant intoxication, during which all objects seen appear to be yellow. Palmer reports that in Tamaulipas a decoction of the plant is employed as a wash to relieve the effects of poison ivy (*Rhus toxicodendron*).

This plant was listed by Sessé and Mociño [1] as "*Ginora* [*Ginoria*] *americana*," a name pertaining to a Cuban plant of a different genus. It is described also by Hernández.[2]

7. LAGERSTROEMIA L. Syst. Nat. ed. 10. 1076. 1759.

The species are all natives of the Old World.

1. Lagerstroemia indica L. Sp. Pl. ed. 2. 734. 1762.

Commonly cultivated in Mexico and sometimes escaping. Native of Asia, East Indies, and Australia, but widely cultivated.

Shrub or tree, 2 to 7 meters high, the trunk 6 to 17 cm. in diameter, the bark smooth, gray; leaves alternate, sessile or nearly so, oblong-elliptic to rounded, 2 to 7 cm. long, short-acuminate, rounded, or emarginate at apex, glabrous or hirtellous beneath along the nerves; flowers in terminal panicles, pedicellate, 4 to 7-parted; calyx campanulate, 7 to 10 mm. long; petals white, pink, or purple, 12 to 20 mm. long, on slender claws, the blade orbicular-cordate, crispate and erose; stamens 36 to 42; capsule 6-celled, 9 to 13 mm. long, ellipsoid-globose. "Astronómica" (Durango, Oaxaca, etc.); "crespón" (San Luis Potosí); "atmosférica" (Durango, Oaxaca); "atmósfera" (Sinaloa); "Júpiter" (Cuba, El Salvador, Nicaragua); "astromeda" (Porto Rico); "melindres" (Philippines).

Crape-myrtle is an extremely handsome plant, with very showy and handsome flowers which are borne in great profusion and for most of the year. Although it grows well in the tropics, it is not a tropical plant, but can stand considerable freezing. In the United States it is hardy as far north as Baltimore, and is grown out of doors still farther north.

8. GINORIA Jacq. Enum. Pl. Carib. 5. 1760.

Six other species are known, all natives of the West Indies.

1. Ginoria nudiflora (Hemsl.) Koehne, Bot. Jahrb. Engler 3: 351. 1882.

Antherylium nudiflorum Hemsl. Diag. Pl. Mex. 13. 1878.

The type was collected somewhere in southern Mexico by Jurgensen; the writer has seen another specimen collected by Galeotti in 1845, probably in Oaxaca.

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[1] Pl. Nov. Hisp. 78. 1887.

[2] Thesaurus 105, 415. 1651.

Glabrous shrub or tree, leafless at anthesis, the leaves not known; flowers in axillary 5 to 10-flowered umbels, the pedicels 5 to 12 mm. long, slender; calyx 6 mm. long, 4-lobate; petals about 7 mm. long, erose; stamens 28 to 30; ovary 3 or 4-celled.

119. PUNICACEAE. Pomegranate Family.

The family consists of a single genus and species.

1. PUNICA L. Sp. Pl. 472. 1753.

The generic name is derived from the Latin name for the Carthaginians (*Punici*), who are said to have introduced the pomegranate into Italy.

1. Punica granatum L. Sp. Pl. 472. 1753.

Common in cultivation nearly throughout Mexico. Native of the Mediterranean region, but cultivated everywhere in warm countries.

Shrub or small tree, 6 meters high or less, sometimes with a short trunk, the bark very thin, brownish gray, shallowly reticulate; leaves opposite or clustered, short-petiolate, elliptic, oblong, or oblanceolate, 2 to 6 cm. long, obtuse, attenuate at base, entire, glabrous; flowers perfect, short-pedicellate, solitary or clustered; calyx leathery, 5 to 7-lobate, the lobes triangular; petals 5 to 7, obovate to suborbicular, 1.5 to 2.5 cm. long, bright red; stamens numerous; fruit a leathery berry, globose, 5 to 10 cm. in diameter, several-celled; seeds numerous, surrounded by white or pink, acidulous pulp; wood hard, close-grained, light yellow, its specific gravity about 0.93. The plant is known everywhere in Spanish-speaking countries as "granado," the fruit as "granada"; the following names also are reported: "Tzapyan," "tzapyon" (Mixe, *Belmar*); "yaga-zehi" (Oaxaca, Zapotec, *Reko*); "yutnu-didzi" (Oaxaca, Mixtec, *Reko*).

The pomegranate is cultivated in the southern United States and is hardy as far north as the city of Washington. It is one of the best of the tropical fruits, being one of the few that are acidulous, most tropical fruits being sweet or insipid. It is a favorite fruit in Mexico, where numerous varieties are grown, such as the "granada de China," "granada agria," and others. The principal variation is in the size of the fruit and the color of the pulp. The pomegranates of Tehuacán, Puebla, are famous for their quality. The fruit is eaten without special preparation, or is made into sherbets and beverages.

The hard wood is sometimes used by engravers as a substitute for boxwood (*Buxus sempervirens*). The bark and the rind of the fruit are astringent, and are employed for tanning and dyeing leather. The bark, with iron sulphate, gives a black ink, and the flowers with alum a red ink.

The bark of the stem and root is official in the United States Pharmacopoeia, its active power being due to an alkaloid, pelletierine. The bark contains over 22 per cent of tannic acid. The bark is employed as a vermifuge and teniafuge, being particularly efficient for the latter purpose. It is used locally also for dysentery and intermittent fevers and as a gargle for sore throat.

120. RHIZOPHORACEAE. Mangrove Family.

1. RHIZOPHORA L. Sp. Pl. 443. 1753.

The genus consists of about three species, widely distributed on tropical coasts.

1. Rhizophora mangle L. Sp. Pl. 443. 1753.

Common along both Mexican coasts from Tamaulipas and southern Baja California southward. Widely distributed in tropical America.

Tree, sometimes 25 meters high, with a trunk 1.2 meters in diameter, but usually much smaller; bark thin, brownish gray, shallowly furrowed, red within; leaves opposite, petiolate, obovate or elliptic, 5 to 15 cm. long, obtuse, entire, leathery, glabrous, dark green, with deciduous stipules; flowers perfect, on 2 or 3-flowered axillary peduncles; calyx leathery, 4-lobed; petals 4, yellowish white, linear, hairy; stamens 8; fruit baccate, conic, 2 to 2.5 cm. long, leathery, brown; seed usually germinating in the fruit, the radicle pushing out and growing downward, becoming 25 to 30 cm. long before it falls from the plant and takes root in the mud; wood hard, close-grained, strong, dark red-brown, its specific gravity about 1.16. "Tab-ché" or "tap-ché" (Yucatán, Maya); "mangle" (Baja California, Oaxaca, and elsewhere, Costa Rica, Porto Rico, Santo Domingo, etc.; the word probably of Carib origin; "manglar" is a mangrove thicket); "mangle dulce" (Baja California); "mangle colorado" (Tabasco, Tamaulipas, Oaxaca, Veracruz, Guerrero, Cuba, Panama, Guatemala, Porto Rico, Venezuela); "mangle tinto" (Veracruz); "candelón" (Veracruz, Colima, Sinaloa, *Ramírez*); "mangle salado" (Panama); "mangle zapatero" (Porto Rico); "mangle gateador" (Costa Rica).

The mangrove (sometimes known as "red mangrove") is the most abundant and conspicuous tree of tropical coasts, forming dense forests or thickets of great extent almost everywhere that the water is brackish. The plants send out numerous arching prop roots in all directions, which are covered at high tide, and these form impenetrable tangles. The roots are often covered with oysters. The mangrove is important in land building, preventing washing away of land by waves and also affording a place of protection for soil and refuse. Thus small islands gradually increase greatly in size. The soil underneath mangrove trees usually consists of black oozy mud, and the mangrove forests are extremely repellent in appearance when seen at close hand, although when viewed from a distance they are strikingly handsome.

The wood is used for fuel and for building wharfs and docks, since it is durable in water and is not attacked by the mollusk *Teredo*. Clavigero states that it was employed for making oars, and Oviedo states that "it is one of the best woods there is here (West Indies) for the poles of huts and timbers of houses, and for door and window frames." The leaves and especially the bark are rich in tannin and the latter is used for tanning leather. The bark, with salts of copper or iron, yields olive, brown, and slate dyes. Of the fruit, Oviedo (Lib. IX, Cap. VI) states that it "is tawny and within is a marrow or heart which the Indians eat when they can find no better fruit (for it is somewhat bitter), and they say it is wholesome." The bark has been employed as a febrifuge and to stop hemorrhages, also as a remedy for sore throat. Pittier reports that in Panama a red dye is obtained from the young shoots.

121. COMBRETACEAE. Combretum Family.

Trees or shrubs, sometimes scandent, in some genera armed with spines; leaves opposite or alternate, entire, estipulate; flowers spicate, racemose, or capitate, bracteate, perfect or polygamo-dioecious; calyx tube adnate to the ovary, the limb 4 or 5-lobate, the lobes usually valvate; petals 4 or 5 or none, small; stamens as many or twice as many as the calyx lobes, inserted on the limb or base of the calyx; style simple, the stigma entire; fruit coriaceous or drupaceous, 1-celled, 1-seeded, indehiscent.

Flowers in dense globose conelike heads_____1. **CONOCARPUS.**
Flowers spicate or racemose.
Leaves alternate; petals none.
Calyx limb deciduous; branches unarmed_____2. **TERMINALIA.**
Calyx limb persistent; branches usually armed with spines___3. **BUCIDA.**
Leaves opposite; petals present.
Calyx limb persistent; fruit not winged; plants erect.
4. LAGUNCULARIA.
Calyx limb deciduous; fruit broadly winged; plants scandent.
5. COMBRETUM.

1. CONOCARPUS L. Sp. Pl. 176. 1753.

A single species is known.

1. Conocarpus erecta L. Sp. Pl. 176. 1753.

On both coasts of Mexico, from Tamaulipas and southern Baja California southward. Widely distributed on tropical American shores and in western Africa.

Variable in size, sometimes a prostrate shrub but usually erect, becoming a tree 20 meters high, with a trunk 80 cm. in diameter; bark dark brown, fissured into irregular ridges and thin scales; leaves alternate, short-petiolate, obovate to elliptic or oval, 2 to 10 cm. long, obtuse or acute at each end, entire, leathery, glabrous or sericeous, the petiole bearing 2 glands; flowers perfect, very small, green, in globose paniculate heads 1 cm. or less in diameter; calyx 2 mm. long; corolla none; stamens usually 5, exserted; fruit a conelike head of small flat winged scalelike drupes, purplish green; wood hard, close-grained, grayish or yellowish brown, its specific gravity nearly 1.00. "Mangle negro" (Oaxaca); "xtabché" or "xkanché" (Yucatán, Maya); "estachahuite" (from the Nahuatl *iztac-cuahuitl*, "white-tree," referring to the whitish branches, *Reko*); "botoncahui" (Sinaloa); "botoncillo" (Yucatán, Venezuela); "mangle" (Guerrero, Santo Domingo); "mangle prieto" (Tabasco); "saragoza" (Colombia, Panama); "mangle botoncillo" (Venezuela, Porto Rico); "mangle botón" (Porto Rico, Cuba); "mangle colorado" (Porto Rico); "mangle piñuelo" (Panama); "yana" (Cuba); "mariquito" (Costa Rica); "mangle torcido" (Panama).

The buttonwood grows in mangrove swamps with the mangroves and *Avicennia nitida*. The wood is used for rafters, boats, cabinet work, and various other purposes; it is said to be durable in the soil. The leaves and bark are employed for tanning skins. The bitter bark finds use locally in medicine as an astringent and tonic.

Conocarpus erecta sericea DC.[1] is a form with densely sericeous leaves. It occurs on both coasts of Mexico with the typical glabrate form. By some authors it has been considered a distinct species, but it grades gradually into the common form.

2. TERMINALIA L. Mant. Pl. 1: 21. 1771.

Trees; leaves alternate, crowded at the ends of the branches, deciduous, petiolate; flowers perfect or polygamous, small, green, in lax elongate spikes; calyx tube constricted above the ovary, the limb campanulate, 5-dentate; petals none; stamens 10; fruit ovoid, compressed or winged, 1-seeded, drupaceous.

Ovary compressed, not winged; calyx limb 2.5 mm. long_____1. T. catappa.
Ovary with 2 broad wings; calyx limb 1.5 mm. long or less____2. T. excelsa.

[1] Prodr. 3: 16. 1828.

1. **Terminalia catappa** L. Mant. Pl. 2: 519. 1771.

Cultivated in Mexico and perhaps naturalized; specimens seen from Sinaloa, Tepic, Guerrero, Oaxaca, and Yucatán. Native of the East Indies, but generally cultivated in tropical regions.

Large tree, sometimes 25 meters high, with a trunk 1.5 meters in diameter, the branches whorled, spreading; leaves obovate, 10 to 30 cm. long, rounded and abruptly pointed at apex, narrowed to the base, nearly glabrous; spikes 5 to 15 cm. long, the pistillate below; fruit a woody drupe, ellipsoid or rounded, 4 to 7 cm. long, compressed, 2-edged; seed 3 to 4 cm. long; wood hard, close-grained, red-brown, the specific gravity about 0.70. "Almendra" (fruit), "almendro" (tree), "almendrón" (Yucatán, Guerrero, Oaxaca, Porto Rico, Costa Rica. Philippines, El Salvador, Santo Domingo); "almendrillo" (Oaxaca); "almendra de la India" (Cuba, El Salvador).

The wood of the Indian almond is a valuable source of lumber when procurable in sufficient quantity. The roots, bark, and fruit contain much tannin, and are employed for tanning skins. The fruit and other parts furnish a permanent black ink and dye, and in India the fruit is employed to color the teeth black. Silkworms are fed upon the leaves. The seeds contain about 50 per cent of a fixed oil. They are edible and are used like almonds; in flavor they suggest filberts. The plant is sometimes used locally in medicine because of its astringent and supposed tonic properties. For illustrations of this species see Contr. U. S. Nat. Herb. 8: *f. 13*, *pl. 57*.

2. **Terminalia excelsa** Liebm. (Hemsl. Biol. Centr. Amer. Bot. 1: 402. 1880, nomen nudum).

Veracruz.

Tree; leaves obovate, obtuse or acute, attenuate at base to a slender petiole, thinly sericeous when young but soon glabrate; racemes lax, 8 to 10 cm. long, finely fulvous-tomentulose; calyx lobes short, rounded or very obtuse; stamens long-exerted, the filaments glabrous; style 3 to 4 mm. long, glabrous; very young fruit thinly fulvous-tomentulose.

No description of this species has been published, apparently. Presumably it was based upon specimens collected at Mirador by Liebmann. The writer has seen a single flowering specimen, with immature leaves, from Zacuapan (*Purpus* 3800), which is probably of the same species. It appears distinct from either of the species recently described from Panama.

According to Ramírez, the tree is known in Veracruz as "pucté."

3. BUCIDA L. Syst. Nat. ed. 10. 2: 1025. 1759.

The genus consists of a single species.

1. **Bucida buceras** L. Syst. Nat. ed. 10. 1025. 1759.

Campeche; reported from Tabasco. Southern Florida, West Indies, and Panama.

Tree, sometimes 25 meters high, with a trunk 90 cm. in diameter, the crown broad and spreading; bark gray, scaly; branches often armed with spines 2 to 3 cm. long; leaves alternate but crowded at the ends of the branches, petiolate, obovate, oval, or elliptic, 3 to 9 cm. long, rounded or retuse at apex, entire, coriaceous, sparsely sericeous when young; flowers perfect, green, in slender spikes; calyx 3 mm. long, sericeous; petals none; stamens 10, exserted; fruit a drupe, ovoid, 7 to 8 mm. long; wood hard, close-grained, yellowish brown, its specific gravity about 1.04. "Puk-té" or "puc-té" (Campeche, Tabasco); "úcar," "búcaro" (Porto Rico); "júcaro de playa" (Cuba).

The tree is said to be abundant in some parts of the Yucatán Peninsula, and to be a valuable source of lumber. The wood is very durable and is em-

ployed for posts, piling, axles, wheel hubs, and other purposes. The bark is employed for tanning. For an illustration of a tree see Contr. U. S. Nat. Herb. 8: *pl. 20.*

4. LAGUNCULARIA Gaertn. f. Fruct. & Sem. 3: 209. 1807.

The genus consists of a single species.

1. **Laguncularia racemosa** (L.) Gaertn. f. Fruct. & Sem. 3: 209. 1807.
Conocarpus racemosa L. Syst. Nat. ed. 10. 930. 1759.

Coasts of Tamaulipas and Yucatán. Southern Florida, West Indies, Panama, South America, and western Africa.

Shrub or tree, sometimes 20 meters high, with a trunk 80 cm. in diameter; bark thin, reddish brown, fissured into long scales; leaves opposite, petiolate, oblong to oval, 2 to 7 cm. long, rounded at apex, entire, leathery, glabrous, the petiole with 2 large glands; flowers perfect or polygamous, in lax clustered spikes; calyx 5-lobate, sericeous, 2 to 3 mm. long; petals 5, suborbicular, not exceeding the calyx; stamens 10; fruit a leathery 10-ribbed reddish drupe, oblong or obovoid, 15 mm. long; wood hard, strong, dense, yellowish brown, its specific gravity about 0.86. "Mangle blanco" (Tamaulipas, Sinaloa, Panama, Porto Rico); "mangle amarillo," "patabán" (Cuba); "mangle prieto" (Santo Domingo); "mangle chino" (Sinaloa).

The white mangrove (known also as "white buttonwood") is usually associated with *Rhizophora mangle, Conocarpus erecta,* and *Avicennia nitida.* The bark contains about 14 per cent of tannin, and is used for tanning skins. It is employed locally in medicine as an astringent and tonic. For an illustration of the flowers see Contr. U. S. Nat. Herb. 8: *pl. 43.*

5. COMBRETUM L. Syst. Nat. ed. 10. 999. 1759.

Scandent shrubs, sometimes armed with spines; leaves opposite, petiolate, entire; flowers polygamo-dioecious, in terete or one-sided spikes or racemes; calyx tube cylindric or angulate, constricted above the ovary, the limb campanulate, 4 or 5-lobate, deciduous; petals 4 or 5, small, inserted between the calyx lobes; stamens 8 or 10, long-exserted; fruit coriaceous, longitudinally 4 to 6-winged, 1-seeded.

Flowers small, the calyx limb less than 2 mm. long; spikes not secund.
Calyx puberulent or tomentose; stems unarmed ..... 1. C. mexicanum.
Calyx glabrous; stems armed with spines ..... 2. C. palmeri.
Flowers large, the calyx limb 4 to 5 mm. long or larger; spikes secund.
Calyx lepidote and pilosulous ..... 3. C. erianthum.
Calyx merely lepidote, not pilosulous ..... 4. C. farinosum.

1. **Combretum mexicanum** Humb. & Bonpl. Pl. Aequin. 2: 159. *pl. 132.* 1809.
? *Combretum odoratissimum* Sessé & Moc. Fl. Mex. 99. 1894.

Guerrero to Oaxaca: type from Acapulco. Nicaragua.

Large vine; leaves short-petiolate, oblong or oval-oblong, 6 to 15 cm. long, obtuse to acuminate, glabrous or nearly so; flowers white, sweet-scented, in dense paniculate spikes; fruit 2 to 2.5 cm. long, puberulent, the wings 4 to 5 mm. wide.

2. **Combretum palmeri** Rose, Contr. U. S. Nat. Herb. 5: 136. 1897.

Known only from the type locality, Acapulco, Guerrero.

Large vine; leaves elliptic to oblong-obovate, 5 to 7 cm. long, obtuse or acute, sparsely pilosulous beneath along the nerves; spikes very lax, in large panicles; flowers white, sweet-scented; petals 2 mm. long; fruit (immature) 1.5 cm. long, glabrous.

3. **Combretum erianthum** Benth. Pl. Hartw. 73. 1840.

Oaxaca and Campeche. Guatemala, the type from Retalhuleu.

Large vine; leaves oblong to elliptic, 7 to 15 cm. long, obtuse to acuminate, densely brownish-lepidote beneath; spikes solitary or paniculate, dense; calyx limb sometimes 1 cm. long; petals 2.5 mm. long; fruit about 2 cm. long, puberulent, with broad wings. "Bejuco de peine," "bejuco de toro" (Oaxaca); "chupamiel," "peine de mico" (El Salvador).

4. **Combretum farinosum** H. B. K. Nov. Gen. & Sp. 6: 110. 1823.

Combretum argenteum Bertol. Nov. Comm. Acad. Bonon. 4: 412. 1840.

Sinaloa to Chiapas and Veracruz; type collected between Acapulco and Venta del Ejido, Guerrero. Guatemala and El Salvador.

Large vine, unarmed; leaves broadly oval to elliptic-oblong, 5 to 15 cm. long, obtuse or short-acuminate, sparsely or densely lepidote beneath; spikes very thick and dense, solitary or paniculate; flowers blood-red or greenish yellow, sweet-scented; calyx limb often 1 cm. long; petals oblong-spatulate to broadly ovate, 1.5 to 2 mm. long, obtuse or acute; fruit about 2 cm. long, lepidote. "Carape" or "carapi" (Michoacán, Guerrero) "peinetillas" (the spikes), "compio" (Sinaloa); "angarilla" (Durango, *Patoni*); "peinecillo" (Veracruz); "quie-tzine" (Oaxaca, *Seler*); "abacamiel," "abamiel" (Central America); "papa-miel" (Nicragua); "chupamiel," "peineta," "chupamiel de peineta," "chupa-chupa" (El Salvador).

The branches were formerly used for arrow shafts and are now sometimes woven into baskets. The showy flowers are full of sweet nectar. When cut, the stems yield a considerable amount of water, a fact of which advantage is taken by travelers through the forests when other water is absent. In Sinaloa the leaves are applied as a remedy for headache.

In a recent account of the species of *Combretum* of the section *Micropetalae*[1], Pittier has treated *C. argenteum* as a valid species, distinguished from *C farinosum* chiefly by its broader petals. Examination of the available material shows that there is too great variation in petal shape to admit of its use as a basis of specific segregation.

122. MYRTACEAE. Myrtle Family.

Trees or shrubs, usually aromatic; leaves entire, opposite, pellucid-punctate or gland-dotted, estipulate; flowers perfect, regular, variously arranged, bibracteolate; calyx tube adnate to the ovary, the limb 4 or 5-lobate, or the lobes united in bud and sometimes circumscissile; petals 4 or 5 or none; stamens numerous; ovary 2 to several-celled, the style simple, the stigma capitate; fruit baccate or drupaceous, large or small, containing 1 to many seeds.

This is one of the large families in tropical America, and its representatives are easily recognized by the combination of punctate leaves, numerous stamens, and characteristic fruit. It is, however, almost impossible to distinguish the genera by the embryo characters upon which they are based, and it is extremely difficult to identify a plant of the family except by comparison with named specimens.

Several species of the Australian genus *Eucalyptus* are grown in Mexico for ornament. They are known as "eucalipto" and "gigante." Eucalyptus trees grow rapidly, and for this reason they are planted in Florida and California as shade trees and as a source of lumber. As shade trees, however, they are not desirable, for their foliage is so thin and their crowns so narrow that they

[1] Contr. U. S. Nat. Herb. 18: 239–246. 1917.

afford little shade, while their roots spread in every direction, making it impossible to grow other plants in their vicinity. They are not particularly handsome trees, and their only good feature is rapidity of growth.

Calyx limb closed in bud or nearly so, in anthesis longitudinally cleft or circumscissile.
Flowers umbellate----------1. **CALYCORECTES.**
Flowers solitary, cymose, or paniculate.
Calyx limb circumscissile; petals 1 or 2 or none--2. **CALYPTRANTHES.**
Calyx limb cleft longitudinally in anthesis, or partly circumscissile but remaining attached to the tube at one side; petals 4 or 5--3. **PSIDIUM.**
Calyx limb not closed in bud, the sepals imbricate.
Embryo circinate, the radicle elongate.
Flowers numerous, in cymes; testa of seed thin----------4. **PIMENTA.**
Flowers solitary or rarely racemose; testa horny----------5. **MYRTUS.**
Embryo not circinate, the cotyledons and radicle folded together, the radicle sometimes very short.
Radicle very short; flowers variously arranged but not paniculate.
6. **EUGENIA.**
Radicle elongate; flowers in loose panicles----------7. **MYRCIA.**

1. **CALYCORECTES** Berg, Linnaea 27: 317. 1854.

1. Calycorectes mexicanus Berg, Linnaea 27: 318. 1854.

Type from mountains of Oaxaca.

Branchlets puberulent; leaves petiolate, oblong, 7.5 to 10 cm. long, 2.5 to 4 cm. wide, obtuse-acuminate, acute at base, glabrous above, puberulent or glabrate beneath; flowers in 2 to 6-flowered umbels equaling or shorter than the petiole, the pedicels 2 mm. long, puberulent; calyx globose, apiculate, rupturing into 4 ovate lobes; petals 4, orbicular, 2 mm. long.

2. **CALYPTRANTHES** Swartz, Prodr. Veg. Ind. Occ. 79. 1788.

Trees or shrubs; flowers small, in axillary and terminal cymes or panicles; calyx tube turbinate, the limb closed in bud, in anthesis circumscissile and deciduous; petals 1 or 2 or none; fruit baccate, 2 or 3-celled, usually 1 or 2-seeded.

The flower buds of the Brazilian *C. aromatica* St. Hil. are used as a spice.

Leaves sessile, cordate at base----------1. **C. karwinskyana.**
Leaves petiolate, rounded to acute at base.
Leaves linear-lanceolate, 10 to 12.5 cm. long, 1.5 to 2 cm. wide.
2. C. lindeniana.
Leaves lanceolate to oval.
Leaves rounded at base, the petioles very short and thick.
3. C. euryphylla.
Leaves acute or obtuse at base, the petioles comparatively long and slender.
Leaves obtuse----------4. **C. zuzygium.**
Leaves acuminate.
Buds glabrous; flowers mostly pedicellate.--------5. **C. schiedeana.**
Buds sericeous; flowers sessile----------6. **C. pendula.**

1. Calyptranthes karwinskyana Berg, Linnaea 29: 214. 1857.

Known only from the type locality, "Mesa Chica," southern Mexico.

Glabrous throughout; leaves ovate-oblong, 9 to 11.5 cm. long, 3.5 to 5 cm. wide, acuminate, clasping at base; cymes equaling the leaves, the flowers in clusters of 3 or 5, sessile, the buds 4 mm. long; petals none.

2. **Calyptranthes lindeniana** Berg, Linnaea **29**: 213. 1857.

Known only from the type locality, Río Teapa, Tabasco.

Branchlets strigose-sericeous; petioles 4 mm. long; leaves narrowed to each end, pilosulous or glabrate; cymes half as long as the leaves, strigose-sericeous; buds 3 mm. long; petals none.

3. **Calyptranthes euryphylla** Standl., sp. nov.

Type from Catemaco, Veracruz (*Nelson* 421; U. S. Nat. Herb. no. 569276).

Branches terete, gray, glabrous; petioles very stout, 2.5 mm. long or shorter; leaf blades ovate-elliptic or elliptic-oval, 3.5 to 6.5 cm. long, 1.8 to 4 cm. wide, rounded at base, abruptly short-acuminate at apex, with obtuse tip, coriaceous, when young minutely strigillose beneath but soon glabrate, the lateral nerves slender but conspicuous on both surfaces, numerous; cymes equaling or longer than the leaves, strigillose or glabrate, the flowers sessile; fruit didymous-globose, about 6 mm. long and 7 mm. broad, 2-celled, 2-seeded.

4. **Calyptranthes zuzygium** (L.) Swartz, Prodr. Veg. Ind. Occ. 79. 1788.

Myrtus zuzygium L. Syst. Nat. ed. 10. 1056. 1759.

Michoacán and Tres Marías Islands. Florida and Greater Antilles.

Tree, sometimes 12 meters high; leaves short-petiolate or subsessile, elliptic-oblong to obovate-elliptic, 3.5 to 7 cm. long, acute at base, coriaceous; cymes equaling or longer than the leaves, glabrous or nearly so, the flowers mostly pedicellate; petals none; fruit subglobose, 8 to 10 mm. in diameter.

5. **Calyptranthes schiedeana** Berg, Linnaea **27**: 28. 1854.

Myrcia aromatica Schlecht. Linnaea **13**: 415. 1839. Not *Calyptranthes aromatica* St. Hil. 1828.

Calyptranthes schlechtendaliana Berg, Linnaea **27**: 29. 1854.

Veracruz, the type from Hacienda de la Laguna. Reported from Panama.

Tree or shrub, glabrous throughout; leaves petiolate, broadly elliptic to lance-oblong, 4.5 to 7.5 cm. long, 2 to 4.5 cm. wide, acute or obtuse at base; cymes shorter than the leaves, many-flowered; fruit globose, 4 to 6 mm. in diameter, 1 to 5-seeded.

6. **Calyptranthes pendula** Berg, Linnaea **27**: 21. 1854.

Sinaloa to Oaxaca; type from mountains of Oaxaca.

Shrub or small tree, 4 to 5 meters high or larger; leaves slender-petiolate, lanceolate to oblong-ovate, 5 to 11 cm. long, acuminate, in age glabrous or nearly so; cymes about as long as the leaves, the flowers glomerate, sessile; buds about 2 mm. long; petals 1 or 2.

Closely related to *C. chytraculia* (L.) Swartz, of the West Indies, and perhaps not distinct.

3. PSIDIUM L. Sp. Pl. 470. 1753.

Trees or shrubs; flowers usually large, the peduncles axillary, 1 to 3-flowered; calyx tube campanulate or urceolate, the limb 4 or 5-lobate, the lobes partly or wholly united before anthesis; petals 4 or 5, spreading, white; fruit baccate, globose or pyriform, commonly 4 or 5-celled, usually large.

Calyx limb at anthesis circumscissile, but remaining attached to the tube on one side.

Leaves 1.2 to 4 cm. long, ovate----------**1. P. sartorianum.**

Leaves 5.5 to 15 cm. long, oblong or elliptic-oblong--**2. P. friedrichsthalianum.**

Calyx limb at or before anthesis splitting vertically into lobes.

Calyx open in bud; leaves small, 6.5 cm. long or less, sessile or subsessile. **3. P. oerstedianum.**

Calyx closed in bud; leaves usually much larger or, if small, conspicuously petiolate.

Lateral nerves of the leaves usually 12 or more, parallel, approximate, impressed above; leaves mostly oblong and rounded or subcordate at base, pale beneath, the pubescence minute, whitish, usually appressed. 4. P. guajava.

Lateral nerves few, 7 to 10, rarely 12, remote, curved, not impressed above; leaves mostly elliptic or oblong-elliptic and often narrowed at base, never pale beneath, the pubescence spreading and often long, commonly brown or fulvous----------5. P. molle.

1. **Psidium sartorianum** (Berg) Niedenzu in Engl. & Prantl, Pflanzenfam. 3[7]: 69. 1893.

Mitranthes sartoriana Berg, Linnaea 29: 248. 1857.

Tepic to Oaxaca, Veracruz, and Yucatán; type from Mirador, Veracruz.

Shrub or tree, sometimes 15 meters high, the bark gray, smooth; leaves petiolate, ovate or broadly ovate, acuminate or abruptly acuminate, obtuse or acute at base, glabrous, the lateral nerves obsolete or nearly so; peduncles axillary, slender, 1-flowered, 1 to 1.5 cm. long; buds glabrous; fruit subglobose, 1.2 to 2 cm. in diameter, greenish yellow, containing several seeds. "Pichiché" (Yucatán, Maya); "arrayán" (Jalisco, Veracruz, Oaxaca, Durango); "guayabillo" (Guerrero, El Salvador).

This tree is often planted for its fruit and as an ornamental tree. The fruit is juicy and has a rich spicy subacid flavor. It is employed chiefly in making refreshing drinks, and is used either fresh or dried. The bark is employed for tanning, and the leaves are reputed to have tonic and astringent properties.

This species has been mentioned in literature as *Myrtus arrayan* H. B. K., an error for which Sereno Watson[1] seems to have been responsible. He had little ground for such an identification, except the fact that the vernacular name "arrayán" was applied to both species. *Myrtus arrayan* is a Peruvian species, and Watson evidently believed that it had been introduced into Mexico from South America. Some Mexican writers have been so ignorant of the significance of the name arrayán that they have suggested that it might be of Carib origin. It is, however, the name applied in Spain to one of the forms of *Myrtus communis*, consequently it is not surprising to find it applied in widely separated localities of America to other Myrtaceous plants.

2. **Psidium friedrichsthalianum** (Berg) Niedenzu in Engl. & Prantl, Pflanzenfam. 3[7]: 69. 1893.

Calyptropsidium friedrichsthalianum Berg, Linnaea 27: 350. 1854.

Oaxaca. Guatemala; cultivated in El Salvador.

Tree, 9 meters high, the branchlets quadrangular, glabrate; petioles 4 to 6 mm. long; leaves thin, acuminate, acute at base, lustrous, nearly glabrous; peduncles slender, 1-flowered, 3.5 cm. long or less; buds glabrous, cuspidate; petals 5, suborbicular or oval, 8 to 14 mm. long; fruit oval or globose, yellow. "Guayaba montés" (Oaxaca); "arrayán" (El Salvador).

3. **Psidium oerstedianum** Berg, Linnaea 27: 360. 1854.

Tepic to Veracruz and Chiapas. Guatemala and Costa Rica; type from Guanacaste, Costa Rica.

Leaves oval-oblong, ovate-elliptic, or oval, acute to rounded at apex, rounded at base, coriaceous, when young usually gray-tomentulose beneath but soon glabrate, the lateral nerves few, not impressed above; peduncles slender, 1-flowered; buds tomentulose or glabrate; petals 5.

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[1]Proc. Amer. Acad. 22: 412. 1887.

4. **Psidium guajava** L. Sp. Pl. 470. 1753.

Psidium pyriferum L. Sp. Pl. ed. 2. 672. 1762.

Psidium pomiferum L. Sp. Pl. ed. 2. 672. 1762.

Widely distributed in Mexico, in the southern part probably native, but in places probably only naturalized; frequent in cultivation. Southern Florida, West Indies, and Central and South America; cultivated in the Old World and in many places thoroughly naturalized.

Shrub or tree, sometimes 8 meters high, with a trunk 30 cm. in diameter; bark scaly, reddish; branchlets quadrangular, tomentulose; leaves short-petiolate, 5 to 15 cm. long, acute or obtuse, the upper surface tomentulose when young but soon glabrate, the lateral nerves very conspicuous beneath; peduncles 1 to 3-flowered; buds tomentulose or glabrate; petals 4 or 5, white, 1.5 to 2 cm. long; fruit globose or pyriform, 3 to 6 cm. in diameter, yellow or pinkish; wood hard, strong, elastic, close-grained, brownish or reddish gray, its specific gravity about 0.69. Known generally as "guayaba" (the fruit) and "guayabo," words of Antillean origin. The following additional names are reported, some of them relating to horticultural varieties: "Jalocote" (from the Nahuatl *xal-xocotl*, sand sour fruit); "guayabo de venado" (Colima; a wild form); "pichí" (Yucatán, Maya); "guayaba de China"; "guayaba colorada"; "guayaba peruana"; "guayaba perulera" (form with pyriform fruit); "guayaba de gusano" (Nicaragua); "guayaba manzano" (Colombia); "posh," "posh-keip" (Mixe, *Belmar;* former the fruit, latter the plant); "enandi" (Tarascan, *León*); "poos," "poos-cuy" (fruit and tree; Zoque, *Gonzales*); "bayabas" (Philippines, a Tagalog corruption of the word *guayaba*).

The name *Psidium pomiferum* relates to the form with globose fruit; *P. pyriferum* to that with pyriform fruit.

The guava is one of the most widely known of tropical fruits, and by many persons it is highly esteemed. The fruit varies greatly in size; the flesh is whitish, yellowish, or pink, full of large seeds, of sweetish or somewhat acid flavor. It has a remarkably strong, musky odor, which is penetrating and persistent. The fruit is rather insipid when raw, and it is more commonly eaten cooked, stewed or made into jelly, paste, preserves, and confections. Guava jelly, particularly, is a noted delicacy. Another species, *P. cattleianum* Sabine, the strawberry guava, a native of Brazil, with glabrous leaves, bears superior fruit, in flavor suggesting a strawberry. It is grown in the United States and perhaps also in parts of Mexico.

In the warmer parts of Mexico and Central America guava bushes often form dense thickets of considerable extent, which are known as "guayabales." The seeds germinate readily, and are spread largely by domestic animals. The plants possess great vitality and behave like weeds. Many Mexican localities are noted for the guavas produced there, and the term "Guayabero" is sometimes applied to the natives of Cuernavaca, because of the abundance of guavas in the vicinity.

The wood is said to take a good polish and to be durable when in contact with the soil, but the trees are usually too small for use. The bark is sometimes employed for tanning. A decoction of the buds is a local remedy in Mexico for diarrhea; the leaves are reputed to be a remedy for itch; and a decoction of the astringent bark is applied to ulcers and taken internally for pains in the stomach.

Guavas are mentioned by all the early writers, as, for instance, Hernández[1] and Acosta. The latter writer, with his customary pessimism, says: "It is

[1] Thesaurus 84-85. 1651.

a tree which is held in low esteem on the mainland and in the islands, for they say it smells like bugs. The flavor of the fruit is very ordinary and the flesh unwholesome."

5. **Psidium molle** Bertol. Nov. Comm. Acad. Bonon. 4: 44. 1840.
Psidium schiedeanum Berg, Linnaea 27: 368. 1854.
Sinaloa to Veracruz and Chiapas. Central America, the type from Guatemala.

Shrub or small tree, often less than a meter high; leaves petiolate, variable in form, obovate-oblong to elliptic or rounded-obovate, 5 to 12 cm. long or larger, rounded at apex or acute, usually narrowed to the base, tomentulose above when young but later glabrate, brownish-tomentose beneath, the pubescence sometimes scant in age; peduncles 1 to 3-flowered; buds usually tomentose, sometimes glabrate; petals white, about 1 cm. long; fruit globose, about 2.5 cm. in diameter, pale yellow, with whitish pulp. "Guayaba agria" (Jalisco); "güísaro" (Costa Rica); "guayabillo" (El Salvador).

The fruit is very acid and not particularly agreeable. The specimens referred here are variable in leaf characters, and it is not improbable that they represent two or more species. On the other hand, it is doubtful whether *P. molle* is distinct from *P. araca* Raddi, a Brazilian species. Some of the Mexican and Central American material has been referred to the latter.

4. PIMENTA Lindl. Coll. Bot. *pl. 19.* 1821–25.

1. **Pimenta officinalis** Lindl. Coll. Bot. *pl. 19.* 1821–25.
Myrtus pimenta L. Sp. Pl. 472. 1753.
Myrtus tabasco Schlecht. Linnaea 5: 542. 1830.
Pimenta officinalis tabasco Berg, Linnaea 27: 425. 1854.
Pimenta pimenta Cockerell, Bull. Torrey Club 19: 95. 1892.
Myrtus piperita Sessé & Moc. Fl. Mex. 136. 1894.
Veracruz, Oaxaca, Tabasco, and probably elsewhere. Central America, West Indies, and northern South America.

Tree, 9 to 12 meters high, the branchlets quadrangular; leaves petiolate, oblong to oval-oblong, 9 to 20 cm. long, rounded or obtuse at apex, obtuse or acute at base, coriaceous, when young sparsely puberulent but soon glabrous; flowers in short, axillary or subterminal cymes, sericeous; buds about 2 mm. long; sepals 4, minute; petals 4, rounded; fruit baccate, 1 or 2-celled, 1 or 2-seeded, globose, 4 to 8 mm. in diameter. "Pimiento" (Oaxaca); "pimienta gorda" (Tabasco, Oaxaca, El Salvador, Guatemala); "pimienta de Tabasco" (Tabasco, Oaxaca); "pimentón" (Tabasco); "xocoxochitl" (Nahuatl); "malagueta" (Tabasco); "pimiento oloroso" (Nicaragua); "Jamaica" (Costa Rica).

It is this tree which furnishes the allspice of commerce, and the tree is culvated for this reason, chiefly in Jamaica. Allspice is the unripe fruit, dried in the sun. The ripe fruit is blackish brown and very odorous. It contains an essential oil. The fruit is used in domestic medicine as a stimulant, and it is said to be smoked like tobacco in some regions. The leaves, either fresh or dried, have a strong, spicy, very agreeable odor. The tree is described by Hernández.[1]

[1] Thesaurus 30. 1651.

5. MYRTUS L. Sp. Pl. 471. 1753.

Shrubs or trees; peduncles usually axillary and 1-flowered, with 2 bractlets at apex; flowers 4 or 5-parted; calyx tube turbinate, the lobes imbricate; petals spreading; fruit baccate, containing 1 or 2 or several seeds.

The Mexican species are difficult to distinguish from those of *Eugenia*, but the Mexican representatives of the latter genus usually have larger leaves and fasciculate flowers. The common myrtle of southern Europe and western Asia, *Myrtus communis* L. ("mirto") is said to be cultivated occasionally in Mexico. Wreaths of its branches were worn by the Athenian magistrates and by victors in the Olympic games.

Flowers fasciculate or racemose; leaves oblong-linear.....1. M. oaxacana.
Flowers solitary; leaves lanceolate or broader.
  Calyx lobes suborbicular, rounded at apex.
    Leaves obtuse, glabrous.....2. M. ehrenbergii.
    Leaves acute, strigillose beneath.....3. M. ledophylla.
  Calyx lobes deltoid or lanceolate, acute or acutish.
    Calyx lobes deltoid; petals 6 mm. long.....4. M. berlandiereana.
    Calyx lobes lance-oblong; petals 3 to 4 mm. long.....5. M. montana.

1. Myrtus oaxacana Standl., sp. nov.

Type collected between Juchitán and Chivela, Oaxaca (*Nelson* 2631; U. S. Nat. Herb. no. 566319).

Branches terete, grayish, glabrous, densely leafy; leaves short-petiolate, oblong-linear or lance-linear, 14 to 40 mm. long, 2 to 4 mm. wide, obtuse, acute at base, glabrous, densely gland-dotted, the lateral nerves evident, the margins thickened; flowers partly fasciculate in the axils and partly in few-flowered racemes, the pedicels slender, 3 to 5 mm. long; bractlets minute; calyx 1 to 1.5 mm. long, glabrous, gland-dotted, the 4 lobes semiorbicular, shorter than the tube; petals glabrous, eciliate, 2.5 mm. long.

The plant is very unlike the other Mexican species of the genus, and it is not at all certain that it is properly referable to *Myrtus*. In general appearance, however, it bears more resemblance to some of the South American species of this genus than to any other Myrtaceous plant seen by the writer.

2. Myrtus ehrenbergii Berg, Linnaea 27: 404. 1854.

San Luis Potosí and perhaps elsewhere, the type collected somewhere in southern Mexico by Ehrenberg.

Branchlets puberulent; leaves short-petiolate, lanceolate or lance-oblong, 1 to 2.5 cm. long, acute or obtuse at base, bright green; pedicels 5 to 14 mm. long, the bractlets minute; petals rounded, ciliolate; fruit 10 mm. long, containing 1 or several seeds. "Arrayán" (*Ramírez*).

The aromatic and astringent leaves are said to be used as a tonic.

3. Myrtus ledophylla Standl., sp. nov.

Veracruz; type from San Martín, Zacuapan (*Purpus* 7804; U. S. Nat. Herb. no. 877551).

Branchlets minutely hirtellous; petioles 1 to 2 mm. long; leaves elliptic to lanceolate, 1 to 4.5 cm. long, 0.5 to 1.4 cm. wide, acute or acuminate, rarely obtuse, obtuse at base, subcoriaceous, sericeous-strigillose beneath or on both surfaces or finally glabrate, paler beneath, the margins strongly revolute; pedicels solitary, 8 to 15 mm. long, the bractlets rounded-ovate; calyx 3 mm. long, tomentulose, the lobes semiorbicular; petals ciliolate; fruit 6 mm. long or larger, 1-seeded.

4. Myrtus berlandiereana Berg, Linnaea 27: 403. 1854.

Described from Mexico, the locality not known, but probably in Veracruz, Tamaulipas, or San Luis Potosí.

Branchlets puberulent; leaves short-petiolate, crowded, rigid, oblong-lanceolate, 1 to 2 cm. long, 4 to 6 mm. wide, acute, obtuse at base, pubescent beneath when young; pedicels 12 mm. long, the bractlets subulate, 1.5 mm. long; calyx lobes 5, ciliolate, 2 mm. long; petals oval.

5. Myrtus montana Benth. Pl. Hartw. 61. 1840.

Ugni montana Berg, Linnaea 27: 392. 1854.

Mountains of Oaxaca; type from Monte Pelado, altitude 2,100 meters.

Densely branched shrub, the branchlets covered with short stout white hairs; leaves short-petiolate, oblong to elliptic, 8 to 13 mm. long, acute or obtuse, acute at base, coriaceous, strigose beneath along the costa or glabrous, pale beneath, the margins revolute; pedicels recurved, 1 to 1.5 cm. long, the bractlets linear, 2 to 4 mm. long; calyx lobes 5, 1.5 mm. long.

Mexican material has been referred to *M. friedrichsthalii* (Berg) Donn. Smith, a species occurring in Guatemala, which is probably not distinct from *M. montana*. The latter name, however, is the older one.

6. EUGENIA L. Sp. Pl. 470. 1753.

Shrubs or trees; inflorescence racemose, cymose, corymbose, or fasciculate, or the flowers rarely solitary; calyx tube globose or turbinate, the limb usually 4-lobate, the lobes imbricate, commonly suborbicular; petals 4, spreading, white; ovary 2-celled; fruit drupaceous or baccate, containing 1 or few seeds.

This is the largest genus of the family Myrtaceae, including probably 500 species in tropical America. The species are most abundant in the West Indies and South America. In Mexico and Central America there are comparatively few species, but it is likely that the number will be greatly increased by further exploration. Probably the number represented among the Mexican collections available for study is greater than in the following list. Several plants of which specimens have been seen probably belong to distinct species, but it is not advisable to attempt to describe them until more ample material has been collected.

The fruit of most of the species is edible, but the amount of flesh is usually scant, and the seeds large. *Eugenia uniflora* L., the Surinam cherry, known in Brazil as "pitanga," is cultivated in Florida, the West Indies, and South America for its edible fruit. This is as much as 2.5 cm. in diameter, deep crimson, juicy, and of good flavor. It is known in Cuba as "cerezo de Cayena" and in El Salvador as "guinda."

Calyx about 1.5 cm. wide ..... 1. E. jambos.
Calyx 1 cm. wide or usually much less.
  Leaves shallowly cordate at base ..... 2. E. truncifiora.
  Leaves obtuse or acute at base or rarely rounded.
    Flowers in cymes, the central flower sessile, or the pedicels sometimes solitary or fasciculate in the leaf axils, the inflorescence then without a rachis.
      Leaves long-acuminate; pedicels filiform ..... 3. E. conzattii.
      Leaves rounded to short-acuminate at apex; pedicels stout.
        Flowers in cymes ..... 4. E. fragrans.
        Flowers fasciculate ..... 5. E. rhombea.
    Flowers never in cymes, usually in short or elongate racemes, most or all of the inflorescences with an evident rachis.

Leaves pilosulous or at least with spreading pubescence on one or both surfaces, the pubescence sometimes chiefly confined to the costa.
Leaves rounded or very obtuse at apex.
Leaves 2 to 3 cm. long, very acute at base_____6. **E. mayana.**
Leaves 3.5 to 8 cm. long, very obtuse at base_____7. **E. sinaloae.**
Leaves acute or acuminate_____8. **E. origanoides.**
Leaves glabrous, or sometimes sericeous-strigillose or tomentose, the pubescence, if any, appressed or closely matted.
Inflorescence densely sericeous or tomentose; leaves often covered beneath with pale sericeous pubescence.
Leaves narrowly oblong or linear-oblong, rounded at apex.
9. E. avicenniae.
Leaves elliptic-lanceolate to elliptic or obovate, or broader, rarely oblong but then acuminate.
Leaves soon glabrous beneath.
Leaves elliptic or oval, 2 to 3.8 cm. wide____10. **E. oaxacana.**
Leaves narrowly oblong-elliptic, 1.3 to 2 cm. wide.
11. E. inconspicua.
Leaves tomentulose or sericeous beneath at maturity.
Leaves tomentulose beneath with matted hairs
12. E. tomentulosa.
Leaves sericeous with very close, straight hairs.
Leaves acute or obtuse-acuminate.
Leaves elliptic or broadly elliptic__13. **E. guatemalensis.**
Leaves oblong_____14. **E. karwinskyana.**
Leaves rounded or very obtuse at apex.
Leaves 1.5 to 3 cm. wide, cuneate-obovate__15. **E. rekoi.**
Leaves 4 to 6.5 cm wide, rounded or obovate-rounded.
16. E. hypargyrea.
Inflorescence glabrous, puberulent, or minutely hirtellous, never sericeous or tomentose; leaves usually quite glabrous, never sericeous or tomentose.
Fruit small, 2.5 to 4 mm. long.
Leaves very obtuse or rounded at apex, 1 to 2.2 cm. long.
17. E. liebmannii.
Leaves attenuate or acuminate at apex, most of them 3 cm. long or larger_____18. **E. capuli.**
Fruit large, 6 to 10 mm. long or longer.
Buds 4 to 5 mm. in diameter_____19. **E. mexicana.**
Buds less than 3 mm. in diameter.
Calyx lobes deltoid, acute or acutish. Leaves rounded or very obtuse at apex_____20. **E. deltoidea.**
Calyx lobes suborbicular, rounded at apex.
Leaves linear-lanceolate, 4.5 to 6.5 cm. long, 6 to 9 mm. wide.
21. E. lindeniana.
Leaves lanceolate to elliptic.
Leaves deep green above, much paler beneath.
22. E. xalapensis.
Leaves concolorous or nearly so.
Leaves small, mostly 3 to 4.5 cm. long, turning black when dry_____23. **E. axillaris.**
Leaves large, mostly 6 to 10 cm. long, not turning black when dried_____24. **E. acapulcensis.**

1. Eugenia jambos L. Sp. Pl. 470. 1753.

Jambosa vulgaris DC. Prodr. 3: 286. 1828.

Jambosa jambos Millsp. Field Mus. Bot. 2: 80. 1900.

Cultivated in Guerrero, Veracruz, Tabasco, and doubtless elsewhere; probably naturalized locally. Native of southeastern Asia and Australia, but widely cultivated and naturalized in tropical regions.

Glabrous tree, 6 to 9 meters high; leaves short-petiolate, narrowly lanceolate, 12 to 20 cm. long, long-attenuate, coriaceous; flowers greenish white, sweet-scented, in few-flowered terminal cymes, the petals 1.5 to 2 cm. long; stamens very numerous, 3 to 4 cm. long; fruit pyriform or subglobose, 3 to 5 cm. thick, white or yellowish, tinged with pink. "Pomarosa" (Veracruz, Oaxaca, El Salvador, Guerrero, Porto Rico); "manzana rosa" (El Salvador).

The rose-apple is cultivated for its fruit, which is fragrant like roses. The fruit is sweet and insipid; it is used locally for making preserves and confectionery. In some parts of the American tropics the tree has become thoroughly naturalized. In Porto Rico the branches are employed for hoops of sugar casks and for coarse baskets. The pulverized seeds are employed in El Salvador as a remedy for diabetes, and the wood is used for fuel. The tree is a handsome one for ornamental planting.

2. Eugenia trunciflora (Schlecht. & Cham.) Berg, Linnaea 27: 223. 1854.

Myrtus trunciflora Schlecht. & Cham. Linnaea 5: 561. 1830.

Veracruz; type material collected between Mesa Chica and Malpique, and at Papantla. El Salvador.

Branchlets pilose or glabrate; leaves short-petiolate, elliptic-oblong, 12 to 25 cm. long, 4 to 10 cm. wide, acuminate, coriaceous, minutely pilosulous beneath or glabrate, lustrous above; pedicels fasciculate on the old branches, the pedicels 8 to 15 mm. long; calyx about 1 cm. wide, the lobes rounded, ciliate. "Icaco" (El Salvador).

The writer has referred here two specimens from Zacuapan, Veracruz (*Purpus* 2434 and 7663). These differ from the original description in having pubescent leaves, and they may be specifically distinct.

3. Eugenia conzattii Standl., sp. nov.

San Luis Potosí, Veracruz, Oaxaca, and Guerrero; type from Apango, Distrito de Pochutla, Oaxaca, altitude 400 meters (*Conzatti, Reko & Makrinius* 3113; U. S. Nat. Herb. no. 763841).

Shrub or small tree, glabrous throughout; leaves short-petiolate, lanceolate to oblong-lanceolate or elliptic, 5 to 8.5 cm. long, 1 to 4 cm. wide, abruptly acuminate or long-acuminate, with acute or obtuse tip, acute or obtuse at base, thin; pedicels sometimes fasciculate but most of the flowers in long-pedunculate 3-flowered cymes, the central flower usually sessile, the lateral ones filiform-pedicellate; calyx about 3 mm. broad, the lobes rounded, ciliate; fruit globose, 6 to 8 mm. long, 1-seeded. "Yagalán" (Oaxaca, *Reko*).

Galeotti 2882 and 2887 from Oaxaca belong here, also *Palmer* 148 from San Luis Potosí, and probably *Rovirosa* 510 from Tabasco. The specimens from eastern Mexico have wider leaves than those from Guerrero and Oaxaca, but probably all are conspecific. Upon the same plant some of the flowers are solitary and others cymose. The fruit is said to be edible.

4. Eugenia fragrans (Swartz) Willd. Sp. Pl. 2: 964. 1800.

Myrtus fragrans Swartz, Prodr. Veg. Ind. Occ. 79. 1788.

Anamomis fragrans Griseb. Fl. Brit. W. Ind. 240. 1860.

Tepic, Durango, San Luis Potosí, Tamaulipas, and Veracruz. West Indies.

Shrub or tree; leaves elliptic-oblong to obovate or elliptic, 2.5 to 7 cm. long, 1.5 to 4 cm. wide, obtuse to rounded at apex, sometimes acutish or emargi-

nate, acute or obtuse at base, coriaceous, glabrous; cymes 3 to several-flowered, or some of the peduncles rarely 1-flowered, the peduncles equaling or shorter than the leaves; calyx 5 to 7 mm. broad, the tube strigillose, the lobes rounded, ciliate; petals white; fruit globose, 8 mm. long or larger, containing 2 or more seeds. "Guayabillo," "pimientilla" (Tamaulipas).

Palmer reports that this is a tree with compact crown, very thin, smooth, whitish bark, and fragrant flowers. The wood is used for building huts and for other purposes.

5. **Eugenia rhombea** (Berg) Krug & Urb. Bot. Jahrb. Engler **19**: 644. 1895.
Eugenia foetida rhombea Berg, Linnaea **27**: 212. 1854.

Veracruz. Southern Florida and West Indies; type from Florida.

Shrub or tree, sometimes 8 meters high, with a trunk 30 cm. in diameter; bark thin, smooth, light gray or reddish gray; leaves short-petiolate, ovate or elliptic, 3 to 6 cm. long, obtuse-acuminate, acute or obtuse at base, coriaceous, pale, glabrous; pedicels fasciculate, 8 to 15 mm. long; calyx about 5 mm. wide, glabrous; fruit globose, about 1.5 cm. in diameter, orange, reddish, or black, with thin dry flesh.

Known in Florida and the British West Indies as "red stopper" and "spiceberry."

6. **Eugenia mayana** Standl., sp. nov.

Type from Izamal, Yucatán (*Gaumer* 714; U. S. Nat. Herb. no. 571749).

Branches terete, gray, densely puberulent when young; leaves short-petiolate, oblong-obovate or obovate, 2 to 3 cm. long, rounded or very obtuse at apex, cuneate-attenuate at base, thin, puberulent, especially on the upper surface, paler beneath, the margins revolute; flowers in dense axillary and lateral glomerules, the pedicels 1 to 2 mm. long, puberulent, the bractlets minute, rounded; calyx about 1 mm. broad, puberulent, the 4 lobes oval, obtuse; petals about 2 mm. long.

7. **Eugenia sinaloae** Standl. sp. nov.

Sinaloa; type from Guadalupe (*Rose, Standley & Russell* 14793; U. S. Nat. Herb. no. 637673).

Shrub or small tree, the branches terete, gray, the young ones brown, densely pilosulous; leaves short-petiolate, oval or oval-obovate, 3.5 to 8 cm. long, 2 to 4.5 cm. wide, rounded at apex, obtuse or rounded at base, minutely pilosulous at first but sometimes glabrate in age, the margins plane; flowers glomerate, but the inflorescence with a very short puberulent rachis; fruit sessile or nearly so, red, 7 to 8 mm. in diameter, 1-seeded. "Guayabillo."

The leaves are said to be used as a remedy for bronchitis.

8. **Eugenia origanoides** Berg, Linnaea **29**: 229. 1857.

Tamaulipas, Veracruz, Tabasco, and Chiapas; type from Papantla, Veracruz.

Shrub or small tree, 2 to 4.5 meters high, the branchlets fulvous-hirtellous; leaves short-petiolate, broadly elliptic to narrowly elliptic-oblong, 5 to 10.5 cm. long, 2 to 5.5 cm. wide, acute or acuminate, acute to rounded at base, rather thin, deep green above, paler beneath, finely hirtellous or pilosulous, in age glabrate; flowers white, sweet-scented, densely glomerate; fruit 6 mm. in diameter or larger, red or black, 1 or 2-seeded. "Escobillo" (Tabasco); "capulín" (Veracruz; the fruit).

Palmer reports that the edible fruit, which is borne in great profusion, is sold in large quantities in the market at Tampico. The flowers are much frequented by bees.

9. Eugenia avicenniae Standl., sp. nov.

Vicinity of Acapulco, Guerrero (type, *Palmer* 57; U. S. Nat. Herb. no. 266797).

Slender shrub, the branches terete, gray, strigillose when young; petioles 1 to 2 mm. long; leaf blades narrowly oblong or linear-oblong, 3.5 to 6 cm. long, 0.7 to 2.3 cm. wide, rounded at apex, slightly narrowed to the obtuse base, coriaceous, thinly strigillose or glabrate; flowers racemose, the racemes half as long as the leaves, 4 or 5-flowered, the pedicels 5 to 8 mm. long, fulvous-sericeous, the bractlets linear, 2 mm. long; calyx 6 to 7 mm. broad, fulvous-sericeous, the lobes rounded; fruit 1 cm. long. "Capulín."

Palmer 358 from Acapulco belongs to this species.

10. Eugenia oaxacana Standl., sp. nov.

Oaxaca and perhaps in Morelos; type from San Gerónimo, Oaxaca (*Purpus* 7139; U. S. Nat. Herb. no. 567463).

Tree, 6 meters high, the branches terete, grayish, densely brownish-strigillose when young; petioles 3 to 7 mm. long, broadly elliptic or oval, 3 to 6 cm. long, 2 to 3.8 cm. wide, rounded or obtuse at apex and base, thin, bright green, subconcolorous, glabrous in age; flowers chiefly in elongate racemes (2 to 3.5 cm. long) but partly solitary, the pedicels stout, 2 to 8 mm. long, brownish-strigillose, the bractlets minute, lance-acuminate, caducous; calyx 7 mm. broad, brownish-sericeous, the lobes broadly rounded, ciliate.

Pringle 7234, from Cuernavaca, is probably referable to this species.

11. Eugenia inconspicua Standl., sp. nov.

Type from Culiacán, Sinaloa (*Palmer* 1786; U. S. Nat. Herb. no. 567797).

Branches terete, gray, cinereous-strigillose when young; petioles 2 to 3 mm. long; leaf blades narrowly oblong-elliptic, 2.5 to 5 cm. long, 1.3 to 2 cm. wide, narrowed to the obtuse apex, acute or attenuate at base, thin, subconcolorous, glabrous, at least in age; inflorescence short-racemose, the rachis 2 to 4 mm. long, the fruiting pedicels 5 to 7 mm. long, whitish-strigillose, the bractlets lance-deltoid, acute, 1.5 mm. long; calyx about 7 mm. broad, the 4 lobes rounded, minutely sericeous; fruit subglobose, 8 mm. long or larger, glabrate.

12. Eugenia tomentulosa Standl., sp. nov.

Type from Acaponeta, Tepic (*Rose* 1476; U. S. Nat. Herb. no. 300313).

Branches terete, gray, the young ones densely grayish-tomentose; petioles very stout, 3 to 9 mm. long; leaf blades oblong-elliptic or obovate, 6.5 to 11.5 cm. long, 3 to 5 cm. wide, obtuse, acute or obtuse at base, coriaceous, opaque, when young densely tomentose on both surfaces, in age glabrate, the venation prominent and reticulate beneath; inflorescence racemose, the racemes 3 to 5-flowered, pedunculate, 3 to 4 cm. long, the pedicels stout, 2 to 5 mm. long, tomentose, the bractlets subulate, caducous; calyx 7 to 10 mm. broad, tomentose, the 4 lobes rounded.

13. Eugenia guatemalensis Donn. Smith, Bot. Gaz. 23: 245. 1897.

Sinaloa to Oaxaca. Guatemala and El Salvador; type from Santa Rosa, Guatemala.

Shrub or tree, 2 to 7 meters high; leaves short-petiolate, mostly elliptic, 3.5 to 8.5 cm. long, 1.5 to 5.5 cm. wide, shortly obtuse-acuminate, acute to very obtuse at base, finely sericeous when young, in age usually glabrate above; flowers in short, dense or lax racemes, or glomerate; calyx about 5 mm. broad, sericeous; fruit oval, 8 to 14 mm. long, black at maturity, 1-seeded. "Guayabillo" (Sinaloa); "capulín" (Guerrero); "guacuco" (El Salvador).

The wood is used in Sinaloa for fence posts. It is not at all certain that all the specimens referred here are conspecific, but without more ample material (eight sheets have been seen) it does not seem advisable to attempt any segregations.

14. Eugenia karwinskyana Berg, Linnaea **29**: 244. 1857.

Type from river banks near Huejutla, Hidalgo.

Branchlets silvery-sericeous; leaves oblong, 5 to 10 cm. long, 2 to 3.5 cm. wide, acuminate, acute at base, thin, silvery-sericeous when young, glabrate in age; racemes 2 to 5 cm. long, 6 to 24-flowered; sepals 4, 1 mm. long; fruit depressed-globose, 6 mm. in diameter.

The writer has seen no specimens which agree with the original description.

15. Eugenia rekoi Standl., sp. nov.

Type from Cafetal Apango, Cerro Huatulco, Oaxaca, altitude 400 meters (*Reko* 3356; U. S. Nat. Herb. no. 842489).

Branchlets brownish, strigillose when young; petioles 2 to 3 mm. long; leaf blades mostly cuneate-obovate, 4.5 to 6 cm. long, 1.5 to 3 cm. wide, rounded or very obtuse at apex, cuneate at base, chartaceous, paler beneath, very minutely strigillose, glabrate in age; flowers glomerate or in very short racemes with nearly obsolete rachis, the pedicels 2 to 3 mm. long, brown-sericeous; calyx lobes rounded, brown-sericeous.

16. Eugenia hypargyrea Standl., sp. nov.

Type from Ternera, Zacuapan, Veracruz (*Purpus* 6171; U. S. Nat. Herb. no. 464686).

Branches brown or gray, the young ones compressed, sericeous; petioles very stout, 5 to 8 mm. long; leaf blades suborbicular to rounded-obovate, 6 to 10 cm. long, 4 to 6.5 cm. wide, broadly rounded at apex, subacute to very obtuse at base, coriaceous, green and glabrous above, densely covered beneath with minute whitish sericeous pubescence; flowers fasciculate or short-racemose, the pedicels stout, 3 to 6 mm. long; fruit globose-oval, about 1 cm. long, 1-seeded.

17. Eugenia liebmannii Standl., sp. nov.

Type from Villa Alta, Oaxaca (*Liebmann* 3969; U. S. Nat. Herb. no. 1012959).

Branches slender, terete, grayish, the young ones brownish, compressed, minutely puberulent; petioles 2 mm. long; leaf blades oblong-elliptic or elliptic, 1 to 2.2 cm. long, 0.7 to 1.2 cm. wide, rounded or very obtuse at apex, obtuse at base, thin, glabrous, deep green above, paler beneath and black-punctate; flowers fasciculate or racemulose, the rachis of the raceme 3 mm. long or less; pedicels very slender, 2.5 to 3 mm. long, puberulent, the bractlets minute, rounded; fruit depressed-globose, 5 mm. broad, 4 mm. long, 1-seeded.

18. Eugenia capuli (Schlecht. & Cham.) Berg, Linnaea **27**: 238. 1854.

Myrtus capuli Schlecht. & Cham. Linnaea **5**: 561. 1830.

Eugenia schiedeana Schlecht. Linnaea **13**: 418. 1839.

Eugenia capuli micrantha Berg, Linnaea **27**: 239. 1854.

Eugenia capuli macroterantha Berg, Linnaea **27**: 239. 1854.

?*Eugenia calycorectoides* Berg, Linnaea **29**: 236. 1857.

Tamaulipas, San Luis Potosí, and Veracruz; type from Papantla, Veracruz. Guatemala.

Shrub or small tree, 2 to 4.5 meters high, with slender branches and dense crown; leaves petiolate, lanceolate to elliptic, mostly 3 to 5.5 cm. long, obtuse-acuminate, acute at base, dark green, usually glabrous; flowers fasciculate

or in very short racemes, slender-pedicellate, the pedicels 2 to 5 mm. long; fruit subglobose, 3 to 4 mm. in diameter, red turning black. "Capulín" (Tamaulipas, Oaxaca, Veracruz); "yagalán" (Oaxaca, *Conzatti*).

The fruit is edible, but the pulp is very scant. The wood is useful only for fuel.

19. Eugenia mexicana Steud. Nom. Bot. ed. 2. 1: 603. 1840.

Eugenia macrocarpa Schlecht. Linnaea 5: 560. 1830. Not *E. macrocarpa* Roxb. 1814.

Veracruz; type from Jalapa.

Shrub or small tree, 4.5 to 6 meters high, glabrous throughout; leaves petiolate, broadly elliptic, 6 to 8.5 cm. long, 2.5 to 5 cm. wide, abruptly obtuse-acuminate, obtuse or rounded at base, bright green above, paler yellow-green beneath, thin; racemes short and dense, 4 to 8-flowered, about equaling the petiole, the flowers subsessile; flowers about 8 mm. broad; fruit 1-seeded.

20. Eugenia deltoidea Standl., sp. nov.

Type collected between San Marcos and Copala, Guerrero, altitude 60 to 150 meters (*Nelson* 2292; U. S. Nat. Herb. no. 569295).

Branches terete, gray, the young ones compressed, brownish, glabrous; petioles slender, 4 to 6 mm. long; leaf blades elliptic-oblong to oval-elliptic, 5 to 6 cm. long, 2 to 3 cm. wide, very obtuse or rounded at apex, obtuse at base, subcoriaceous, glabrous, brownish beneath when dry and densely black-puncticulate; inflorescence racemulose, dense, 1.5 cm. long or less, the racemes with 10 or fewer flowers, the pedicels 1 to 3 mm. long, glabrous; bractlets deltoid or rounded-deltoid, acute or obtuse; calyx 2.5 mm. broad, glabrous, the lobes deltoid, acute to subobtuse, ciliolate; petals densely puncticulate.

21. Eugenia lindeniana Berg, Linnaea 29: 240. 1857.

Type from Teapa, Tabasco.

Branchlets minutely puberulent; leaves linear-lanceolate, attenuate to each end, subobtuse at apex, thin, when young puberulent along the costa but soon glabrous; racemes slender, 4 to 6-flowered, about as long as the petiole, the pedicels 3 to 4 mm. long, puberulent.

Known to the writer only from the original description.

22. Eugenia xalapensis (H. B. K.) DC. Prodr. 3: 276. 1828.

Myrtus xalapensis H. B. K. Nov. Gen. & Sp. 6: 145. 1823.

Veracruz; reported from Oaxaca; type from Jalapa.

Shrub or small tree, glabrous throughout; leaves petiolate, narrowly or broadly elliptic, 3 to 5.5 cm. long, 1.3 to 3 cm. wide, abruptly obtuse-acuminate or cuspidate-acuminate, acute or obtuse at base, dark green above, pale yellowish green beneath; racemes 3 to 9-flowered, short and dense, the pedicels 1.5 to 3 mm. long; fruit subglobose, 8 to 14 mm. in diameter. "Reyán" (Oaxaca, *Conzatti*).

23. Eugenia axillaris (Swartz) Willd. Sp. Pl. 2: 970. 1800.

Myrtus axillaris Swartz, Prodr. Veg. Ind. Occ. 78. 1788.

Veracruz and Yucatán. Southern Florida; West Indies and Central America.

Shrub, or sometimes a tree 8 meters high, with a trunk 30 cm. in diameter; bark thin, light brown, shallowly fissured; leaves elliptic or ovate-elliptic, rather long-petiolate, obtuse or acutish, acute or obtuse at base, glabrous; flowers in small dense clusters as long as the petioles or shorter; corolla 3 to 4 mm. broad; fruit globose, 10 to 12 mm. in diameter, the thin flesh sweet, aro-

matic; wood hard, strong, close-grained, brown or reddish brown, its specific gravity about 0.91. "Guayacán negro," "escobo" (El Salvador).

Known in Florida as "white stopper." The leaves have an unpleasant odor. The Mexican material may be different from that of the West Indies.

24. **Eugenia acapulcensis** Steud. Nom. Bot. ed. 2. 1: 601. 1840.

Myrtus maritima H. B. K. Nov. Gen. & Sp. 6: 146. 1823.

Eugenia maritima DC. Prodr. 3: 282. 1828. Not *E. maritima* DC. Prodr. 3: 227. 1828.

?*Eugenia colipensis* Berg, Linnaea 29: 243. 1857.

Sinaloa to Morelos and Chiapas; type from Acapulco, Guerrero. The type of *E. colipensis* is from Colipa, Veracruz.

Shrub or tree, 3 to 12 meters high; leaves short-petiolate, lanceolate to elliptic-oblong or oval-elliptic, acute or obtuse, rarely obtuse-acuminate, acute to rounded at base, glabrous, brownish beneath when dry; flowers white, racemulose, the racemes about as long as the petioles, dense, the pedicels glabrous or puberulent; fruit red or black, usually oval, 8 to 15 mm. long. "Capulín" (Guerrero).

The edible fruit is sold in the markets. The material referred here is rather variable and may represent two or more species.

7. MYRCIA DC.; Guillem. Dict. Class. Hist. Nat. 11: 378. 1826.

Trees or shrubs; flowers small, in axillary and terminal, loose panicles; calyx tube turbinate or hemispheric, the lobes 5; petals 5, spreading; fruit baccate, usually 2-celled.

The fruit of *M. coriacea* Vahl, of the West Indies, is said to be used medicinally, and its bark for tanning, while the wood yields a dye.

Leaves acute or very shortly acuminate, pilose beneath; branches of the inflorescence with spreading pubescence ..... 1. **M. rufidula.**

Leaves very long cuspidate-acuminate, glabrous beneath except along the costa; pubescence of the inflorescence appressed ..... 2. **M. oerstediana.**

1. **Myrcia rufidula** Schlecht. Linnaea 13: 416. 1839.

Myrcia sartoriana Berg, Linnaea 29: 220. 1857.

Veracruz and Oaxaca; type from Hacienda de la Laguna, Veracruz.

Small tree, the branchlets pilose; leaves nearly sessile, lance-oblong to oblong-ovate, 5 to 13 cm. long, rounded or obtuse at base, glabrate on the upper surface, paler beneath; panicles few or many-flowered, equaling or shorter than the leaves; buds 2 mm. long; petals suborbicular, white, sericeous outside.

2. **Myrcia oerstediana** Berg, Linnaea 27: 112. 1854.

Oaxaca. Costa Rica, the type from Cartago.

Branchlets appressed-pilose at first but soon glabrate; leaves subsessile, narrowly lance-oblong, 6 to 12.5 cm. long, acute or obtuse at base, thin, glabrous above; panicles very lax, shorter than the leaves, the flowers slender-pedicellate; buds 1.5 to 2 mm. long; fruit 6 to 12 mm. long, 1-seeded. "Yagalán" (Oaxaca, Zapotec, *Reko*); "turro" (Costa Rica).

123. MELASTOMACEAE. Meadow-beauty Family.

REFERENCE: Cogniaux in DC. Monogr. Phan. 7. 1891.

Shrubs or trees, or sometimes herbs, usually erect, rarely epiphytic; leaves opposite, entire or toothed, commonly 3 to 9-nerved, in one genus pinnate-nerved, estipulate; flowers perfect, showy or inconspicuous, commonly white, pink, red, purple, or yellow; calyx tube free or adnate to the ovary, the limb

truncate, lobed, or calyptriform; petals as many as the calyx lobes, inserted on the limb of the calyx; stamens as many or twice as many as the petals; style simple, the stigma capitate or punctiform; fruit baccate or capsular, 2 to many-celled.

One of the largest families of American plants, in Mexico confined chiefly to the truly tropical, and generally humid portions of the southern states. Since nearly all the Mexican representatives of the family are woody, it has seemed advisable to include in the present treatment the herbaceous species as well.

One class of terms used in describing the nervation of the leaves in this family should be explained here: Three-nerved or 5-nerved leaves are those in which all the nerves arise from the base of the blade; triplinerved or quintuplinerved leaves are those in which the lateral nerves have their origin above the base of the blade.

Fruit capsular; stamens usually unequal.
Capsule 3-winged, dilated at apex----13. **TRIOLENA.**
Capsule terete or angulate, acute or obtuse at apex.
Connective of the anther usually long-produced below the base of the anther.
Seeds oblong or ovoid.
Anthers rostrate----1. **RHYNCHANTHERA.**
Anthers erostrate----2. **CENTRADENIA.**
Seeds cochleate.
Stamens very unequal; connective of the larger anthers with 2 elongate appendages.
Lobes of the calyx much shorter than the tube.
3. **ARTHROSTEMMA.**
Lobes equaling the tube or nearly so.
Connective of the smaller anthers bilobate anteriorly; connective of the larger anthers bifid or with 2 long spurs anteriorly.
4. **ACISANTHERA.**
Connective of the smaller anthers not bilobate, that of the larger anthers with an elongate bifid appendage.
5. **HETEROCENTRON.**
Stamens subequal, the anthers all of about the same size, the connective merely biauriculate or bituberculate.
Ovary glabrous at apex----6. **ACIOTIS.**
Ovary setose at apex.
Calyx tube with 8 very broad, thick tuberculate-setose ribs.
7. **SCHWACKAEA.**
Calyx tube with very slender nervelike ribs.
Calyx lobes alternating with penicillate-stellate bristles.
8. **PTEROLEPIS.**
Calyx lobes without intermediate bristles--9. **TIBOUCHINA.**
Connective of the anther not conspicuously produced below the base of the anther.
Seeds cochleate----10. **MONOCHAETUM.**
Seeds ovoid or fusiform.
Plants scandent; calyx limb shallowly 5-lobate--11. **ADELOBOTRYS.**
Plants erect; calyx limb circumscissile----12. **CALYPTRELLA.**
Fruit baccate or coriaceous and rupturing irregularly; stamens equal or nearly so.
Leaves pinnate-nerved----24. **MOURIRIA.**

Leaves longitudinally 3 to 9-nerved.
Leaves closely transverse-striolate between the primary nerves.
Filaments very thick; anthers short, obtuse----------22. **BLAKEA.**
Filaments filiform; anthers subulate----------23. **TOPOBEA.**
Leaves not striolate.
Inflorescence terminal.
Petals acute----------14. **LEANDRA.**
Petals obtuse.
Calyx limb calyptriform, circumscissile----------15. **CONOSTEGIA.**
Calyx limb truncate or lobate, open in bud, not circumscissile.
Outer calyx lobes none or inconspicuous----------16. **MICONIA.**
Outer calyx lobes larger than the inner ones.
17. HETEROTRICHUM.
Inflorescence axillary or lateral.
Petals acute----------18. **OSSAEA.**
Petals obtuse.
Leaves with large inflated bladder-like appendages at base.
19. MAIETA.
Leaves not appendaged.
Anthers linear-subulate, with 1 pore at apex----------20. **CLIDEMIA.**
Anthers short, obtuse, with 2 pores at apex----------21. **BELLUCIA.**

1. **RHYNCHANTHERA** DC. Prodr. 3: 106. 1828.

1. **Rhynchanthera mexicana** DC. Prodr. 3: 108. 1828.
Rhynchanthera insignis Naud. Ann. Sci. Nat. III. 12: 210. 1849.
Veracruz and perhaps elsewhere. Panama.

Slender shrub, the branches glandular-hirtellous, terete; leaves long-petiolate, lanceolate or ovate-oblong, 6 to 14 cm. long, long-acuminate, 7 or 9-nerved, rounded or subcordate at base, hispidulous, serrulate; flowers in axillary cymes; calyx tube 5 mm. long, the lobes subulate, 5 to 9 mm. long; petals purple-violet, 3 cm. long, acutish; stamens 10, one of them much larger than the others, rostrate; capsule subglobose, 5 to 7 mm. in diameter.

2. **CENTRADENIA** G. Don, Hist. Dichl. Pl. 2: 755. 1832.

Herbs or small shrubs, alternately branched; leaves petiolate, very unequal at base, entire; flowers small, pink or white, in corymbiform cymes, 4-parted; petals obovate or rounded; stamens unequal, the anthers obtuse, the connective produced below, bearing a clavate or bilobate appendage; capsule 4-celled, the seeds minute.

Stems glabrous----------1. **C. chiapensis.**
Stems puberulent, pilose, or hirtellous.
Stems glandular-pilose, winged----------2. **C. grandifolia.**
Stems hirtellous or puberulent, the pubescence not glandular; stems not winged.
Pedicels glandular-pilose; leaves 1.5 to 3 cm. wide----------3. **C. salicifolia.**
Pedicels without glandular pubescence; leaves mostly less than 1 cm. wide.
4. C. inaequilateralis.

1. **Centradenia chiapensis** T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 501. 1919.
Known only from the type locality, Cerro del Boquerón, Chiapas.

Stems 30 cm. high, 4-angulate; leaves ovate-acuminate. 13 cm. long and 4 cm. wide or smaller, cuneate at base, hirtellous above, pilose beneath along the nerves; calyx 6 mm. long, glabrous; petals 4 mm. long.

2. Centradenia grandifolia (Schlecht.) Endl. Gen. Pl. 1207. 1836–50.
Plagiophyllum grandifolium Schlecht. Linnaea 13: 429. 1839.
Type from Chiconquiaco, Veracruz. Guatemala.
Stems 30 to 50 cm. high; leaves oblong-lanceolate, 7 to 11 cm. long and 2 to 3 cm. wide or smaller, acuminate, pilosulous; cymes many-flowered; petals 8 mm. long.

3. Centradenia salicifolia T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 379. 1913.
Known only from the type locality, wet rocky slopes of the Sierra Madre above Misantla, Veracruz.
Stems suffrutescent, puberulent or glabrate; leaves lanceolate, 13 cm. long or less, nearly glabrous; cymes lax, many-flowered; calyx sparsely setose; petals purplish, 6 to 7 mm. long.

4. Centradenia inaequilateralis (Schlecht. & Cham.) Don, Hist. Dichl. Pl. 2: 755. 1832.
Rhexia inaequilateralis Schlecht. & Cham. Linnaea 5: 567. 1830.
Plagiophyllum parvifolium Schlecht. Linnaea 13: 428. 1839.
Centradenia rosea Lindl. Bot. Reg. 29: *pl. 20.* 1843.
Veracruz; type from Cuesta Grande de Chiconquiaco. Central America.
Plants very slender, 30 to 80 cm. high, often suffrutescent, short-hirtellous; leaves mostly 2 to 4 cm. long, sometimes larger, narrowly lanceolate, sparsely hirtellous or glabrate; calyx hirtellous; petals 5 to 6 mm. long, purplish pink.

3. ARTHROSTEMMA Ruiz & Pav. Fl. Peruv. Chil. 4: *pl. 326.* 1802.

Plants herbaceous or sometimes suffrutescent at base, dichotomous; leaves petiolate, 5 or 7-nerved, serrulate; flowers terminal, cymose, pink or purple, 4-parted; calyx glabrous, the tube narrow, the lobes very short; petals obovate; anthers obtuse, the connective of the larger ones produced below the cells, with a filiform anterior appendage; capsule 4-valvate.

Stamens all of about equal length ..... 1. A. fragile.
Stamens very unequal, the larger ones twice as long as the others. 2. A. campanulare.

1. Arthrostemma fragile Lindl. Journ. Hort. Soc. 3: 74 1848.
Heteronoma galeottianum Naud. Ann. Sci. Nat. III. 14: 151. 1850.
Veracruz and Chiapas. Central America; Cuba.
Stems succulent, glabrous or sparsely glandular-pilose; leaves oblong-ovate, 3 to 6.5 cm. long, acuminate, rounded at base, 5-nerved; calyx 7 to 9 mm. long; petals pink, 2 to 2.5 cm. long; capsule 10 to 12 mm. long. "Jazmín montés" (El Salvador).

2. Arthrostemma campanulare (Naud.) Triana, Trans. Linn. Soc. 28: 35. 1871.
Heteronoma campanulare Naud. Ann. Sci. Nat. III. 14: 153. 1850.
Chiapas. Central America and northern South America.
Branches sparsely glandular-pilose when young or glabrous; leaves ovate or oblong-ovate, 4 to 6 cm. long acuminate, rounded or subcordate at base, 5-nerved; calyx 7 to 8 mm. long; petals purple, 1.5 to 2 cm. long; capsule about 1.5 cm. long.

4. ACISANTHERA Adans. Fam. Pl. 2: 85. 1763.

1. Acisanthera quadrata Juss.; Poir. Encycl. Suppl. 1: 111. 1810.
Rhexia acisanthera L. Syst. Nat. ed. 10. 998. 1759.
Guerrero and Veracruz. West Indies; Central and South America.

Plants herbaceous, usually much branched, the stems glandular-pilose; leaves petiolate, broadly ovate to ovate-lanceolate, obtuse or acute, 1 to 1.5 cm. long, serrulate; flowers solitary; calyx tube 3 mm. long; petals pink or purple, 6 mm. long.

5. **HETEROCENTRON** Hook. & Arn. Bot. Beechey Voy. 290. 1840.

Plants herbaceous or suffrutescent; leaves 3-nerved or pinnate-nerved; flowers solitary or paniculate, 4-parted; calyx tube ovoid or hemispheric, the lobes triangular, acute, about as long as the tube; petals ovate or obovate; stamens very unequal, the connective of the larger anther long-produced below the cells and appendaged; capsule 4-valvate.

The following species are all that are known.

Flowers solitary.
  Calyx glandular-setose; leaves 3-nerved----------1. **H. elegans.**
  Calyx setulose with glandular hairs; leaves pinnate-nerved.
    2. **H. suffruticosum.**

Flowers paniculate.
  Pedicels glabrous.
    Pedicels in anthesis little if at all exceeding the calyx tube; calyx lobes lance-triangular----------3. **H. subtriplinervium.**
    Pedicels in anthesis more than twice as long as the calyx tube; calyx lobes linear----------4. **H. laxiflorum.**
  Pedicels setulose.
    Calyx tube glandular-setulose.
      Calyx lobes not ciliate----------5. **H. axillare.**
      Calyx lobes usually conspicuously ciliate----------6. **H. mexicanum.**
    Calyx tube without gland-tipped hairs.
      Scales at apex of the ovary not ciliate.
        Calyx tube 3 mm. long; leaves 1 to 2.5 cm. wide----------7. **H. roseum.**
        Calyx tube 4 to 5 mm. long; leaves 2.5 to 3 cm. wide-8. **H. occidentale.**
      Scales setose-ciliate.
        Branches conspicuously winged----------9. **H. alatum.**
        Branches not winged----------10. **H. macrostachyum.**

1. **Heterocentron elegans** (Schlecht.) Kuntze, Rev. Gen. Pl. 1: 247. 1891.
  Heeria elegans Schlecht. Linnaea 13: 432. 1839.
  Heeria procumbens Naud. Ann. Sci. Nat. III. 14: 151. 1850.
  Schizocentron elegans Meisn. Gen. Comm. 355. 1843.
  Veracruz; type from Jalapa.

Stems prostrate, herbaceous or suffrutescent, appressed-setulose; leaves broadly ovate, 5 to 12 mm. long, obtuse or acute, crenulate, ciliate; flowers long-pedicellate; calyx tube densely glandular-setulose, the hairs with enlarged bases; petals 10 to 12 mm. long, bright crimson; scales at apex of ovary ciliate.

This plant has been cultivated in the United States under the names "crimson creeper," and *Heeria mexicana.*

2. **Heterocentron suffruticosum** T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 57. 1914.

Type from Cerro del Boquerón, Chiapas.

Stems decumbent, suffrutescent, appressed-setulose, the roots tuberiferous; leaves broadly ovate or rounded, 3 to 5.5 cm. long, rounded or very obtuse at apex, entire, sparsely appressed-setulose; flowers long-pedicellate; petals pink or purple, 14 mm. long.

3. Heterocentron subtriplinervium (Link & Otto) A. Br. Ind. Sem. Hort. Berol. App. 3. 1851.

Melastoma subtriplinervia Link & Otto, Icon. Pl. Rar. *pl. 24.* 1841.

Heeria subtriplinervia Triana, Trans. Linn. Soc. Bot. **28**: 34. 1871.

Veracruz and Oaxaca. Guatemala.

Stems erect or decumbent, chiefly herbaceous, sparsely setulose; leaves elliptic-oblong or oblong-lanceolate, 3 to 6 cm. long, acute, 9 to 13-nerved, attenuate at base; petals white, about 1 cm. long. "Caña de venado" (Veracruz).

Said to be employed in Veracruz as a remedy for gonorrhoea.

4. Heterocentron laxiflorum Standl., sp. nov.

Type from El Ocote, Cerro Pedregoso, Michoacán or Guerrero (*Langlassé* 536; U. S. Nat. Herb. no. 386019).

Stems suffrutescent, quadrangular, 1.5 meters high, sparsely appressed-setulose; leaves slender-petiolate, lance-oblong or ovate-oblong, 3 to 5 cm. long, 1 to 2 cm. wide, acute, attenuate at base, pinnate-nerved, thin, ciliate, sparsely appressed-setulose; panicles many-flowered, the branches very slender, glabrous, the pedicels filiform, curved, 7 to 10 mm. long; calyx tube 2.5 mm. long, glabrous or sparsely short-setulose with eglandular hairs, the lobes 4 to 5 mm. long, linear or nearly so, eciliate; petals white, 7 to 8 mm. long; capsule about 5 mm. long, the lobes eciliate.

5. Heterocentron axillare Naud. Ann. Sci. Nat. III. **14**: 155. 1850.

Heterocentron alpestre Naud. Ann. Sci. Nat. III. **14**: 156. 1850.

Heterocentron glandulosum Schenck in Regel, Gartenfl. **1856**: 227. *pl. 169.* 1856.

Heeria axillaris Cogn. in DC. Monogr. Phan. 7: 138. 1891.

Veracruz and Oaxaca. Central America.

Stems herbaceous or suffrutescent, appressed-setulose; leaves elliptic-oblong or ovate-oblong, 3 to 6.5 cm. long, acute, entire, densely setulose; petals pink, 6 to 8 mm. long.

6. Heterocentron mexicanum Hook. & Arn. Bot. Beechey Voy. 290. 1840.

Heterocentron undulatum Naud. Ann. Sci. Nat. III. **14**: 155. 1850.

Heeria undulata Triana, Trans. Linn. Soc. Bot. **28**: 34. 1871.

Sinaloa, Durango, Tepic, Jalisco, and Guerrero; type from the Sierra Madre.

Stems chiefly herbaceous, erect, appressed-setulose; leaves oblong to elliptic, 3 to 7 cm. long, obtuse or acute, appressed-setulose; petals white or pink, 5 to 8 mm. long.

7. Heterocentron roseum A. Br. & Bouché, Ind. Sem. Hort. Berol. 14. 1851.

Heeria rosea Triana, Trans. Linn. Soc. Bot. **28**: 34. 1871.

Veracruz, Oaxaca, and Chiapas. Honduras.

Stems appressed-setulose, acutely quadrangular; leaves oblong or oblong-ovate, 3 to 5 cm. long, acute, attenuate at base; petals white or pink, about 8 mm. long.

In Guanajuato, where the plant is cultivated, it is said to be known as "perla de Cuba."

8. Heterocentron occidentale Rose, Contr. U. S. Nat. Herb. **8**: 327. 1905.

Type collected between Pedro Paulo and San Blascito, Tepic.

Stems suffrutescent, about 2 meters high, densely appressed-setulose; leaves ovate or oblong-ovate, 6 to 8 cm. long, acute, densely appressed-setulose; petals white, 8 to 10 mm. long.

9. Heterocentron alatum Rose & Standl., sp. nov.

Type collected near San Juan Guichicovi, Oaxaca (*Nelson* 2728; U. S. Nat. Herb. no. 842869).

Stems 4-angled, with a conspicuous green wing along each angle, appressed-setulose; leaves slender-petiolate, elliptic-oblong or oblong-ovate, 3.5 to 6 cm. long, 1.5 to 2.3 cm. wide, acute, attenuate at base, pinnate-nerved, appressed-setulose; panicles many-flowered, the flowers short-pedicellate; calyx tube 3 mm. long, with a few short stiff hairs, the lobes 4 to 5 mm. long, ovate-lanceolate, acuminate, obscurely ciliolate; petals white, about 1 cm. long; capsule 6 mm. long, the apical scales setose-ciliate.

10. Heterocentron macrostachyum Naud. Ann. Sci. Nat. III. 14: 155. 1850.

Heeria macrostachya Triana, Trans. Linn. Soc. Bot. 28: 34. 1871.

Veracruz and Oaxaca. Guatemala and El Salvador.

Stems appressed-setulose, quadrangular; leaves elliptic-ovate or ovate-oblong, 3 to 7 cm. long, obtuse or acute, attenuate at base; petals white or lilac, 7 to 8 mm. long.

6. ACIOTIS D. Don, Mem. Wern. Soc. 4: 300. 1823.

1. Aciotis rostellata (Naud.) Triana, Trans. Linn. Soc. Bot. 29: 51. 1871.

Spennera rostellata Naud. Ann. Sci. Nat. III. 14: 143. 1850.

Tabasco. Guatemala and Nicaragua.

Stems herbaceous or suffrutescent, 30 to 60 cm. high, acutely tetragonous, shortly glandular-pilose above; leaves ovate-oblong, 7-nerved, 5 to 7 cm. long, acuminate, pilosulous, entire; flowers 4-parted, paniculate; calyx 1.5 mm. long; petals white, 2 mm. long; capsule 2.5 mm. thick.

7. SCHWACKAEA Cogn. in Durand, Ind. Gen. Phan. 132. 1888.

The genus consists of a single species.

1. Schwackaea cupheoides (Benth.) Cogn. in Durand, Ind. Gen. Phan. 132. 1888.

Heeria cupheoides Benth. Bot. Voy. Sulph. 93. *pl. 33.* 1844.

Pterogastra cupheoides Seem. Bot. Voy. Herald 122. 1854.

Acisanthera simplex T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 57. 1914.

Oaxaca and Chiapas. Central America; type from Panama.

Slender annual, 10 to 30 cm. high, the branches setulose at the nodes, elsewhere glabrous; leaves petiolate, ovate, 3 to 6 cm. long, acute, 3-nerved, entire, pilosulous; flowers 4-parted, solitary or in terminal cymes; calyx in fruit 1 cm. long, the tube with 8 thick ribs, these setose-tuberculate; petals 6 to 7 mm. long. "Sulfatillo," "sulfato de la tierra," "pollito" (El Salvador).

8. PTEROLEPIS Miq. Comm. Phytogr. 73. 1840.

Herbs, rarely suffrutescent; leaves entire, 3 or 5-nerved; flowers 4-parted, small, axillary or terminal, solitary or glomerate; calyx lobes rigid, persistent, alternating with bristles; petals obovate, obtuse, ciliate; capsule 4-valvate.

Connective of the larger anthers much shorter than the anther---1. P. exigua.
Connective nearly as long as the anther.
Anthers linear-subulate; calyx tube 4 mm. long---2. P. trichotoma.
Anthers oblong; calyx tube 2 to 2.5 mm. long---3. P. pumila.

1. Pterolepis exigua (Naud.) Triana, Trans. Linn. Soc. Bot. 28: 39. 1871.

Arthrostemma exiguum Naud. Ann. Sci. Nat. III. 13: 355. 1850.

Oaxaca and Chiapas; type from mountains of Oaxaca. Costa Rica.

Stems sparsely branched or simple, appressed-setose; leaves lance-oblong, 1 to 3 cm. long, acute, setose; calyx tube 3 mm. long; petals pink, 5 to 6 mm. long.

2. **Pterolepis trichotoma** (Rottb.) Cogn. in Mart. Fl. Bras. 14³: 261. 1885.
Rhexia trichotoma Rottb. Descr. Pl. Surin. 9. *pl. 5.* 1776.
Rhexia ladanoides Rich. in Humb. & Bonpl. Monogr. Melast. 2: 72. *pl. 27.* 1823.
Pterolepis ladanoides Triana, Trans. Linn. Soc. Bot. 28: 39. 1871.
Veracruz and perhaps elsewhere. Central and South America.
Stems herbaceous, 20 to 30 cm. high, appressed-setose; leaves lanceolate or lance-oblong, 3 to 8 cm. long, short-petiolate; petals pink, 8 to 10 mm. long.

3. **Pterolepis pumila** (DC.) Cogn. in Mart. Fl. Bras. 14³: 263. 1885.
Osbeckia pumila DC. Prodr. 3: 141. 1828.
Reported from Oaxaca. Central and South America.
Leaves short-petiolate or subsessile, lanceolate or oblong-lanceolate, 1.5 to 2.5 cm. long, setose-pilose; petals pink, 5 to 6 mm. long.

9. TIBOUCHINA Aubl. Pl. Guian. 445. 1775.

Shrubs or rarely herbs; leaves 3 or 5-nerved, entire or serrulate; flowers 5-parted, solitary or in terminal panicles; calyx tube oblong or urceolate, the lobes narrow, persistent or deciduous; petals obovate; stamens unequal or subequal, the anthers similar, the connective produced below the cells but sometimes very shortly so; capsule 5-valvate.

Calyx with gland-tipped hairs.
Pubescence of the young branches widely spreading_____1. **T. purpusii.**
Pubescence of the young stems appressed.
Hairs on the upper surface of the leaf and on the stems long and slender. **2. T. galeottiana.**
Hairs on the leaves and stems short, thickened at base__**3. T. durangensis.**
Calyx with eglandular hairs.
Connective of the larger anthers long-produced at the base (about 2 mm. or more).
Pubescence of the stems spreading_____**4. T. rufipilis.**
Pubescence of the stems appressed_____**5. T. mexicana.**
Connective very shortly produced (1 mm. or less).
Stamens equal in length or nearly so.
Lobes of the calyx shorter than the tube_____**6. T. bourgaeana.**
Lobes equaling or longer than the tube.
Hairs of the stem short, closely appressed; leaves serrulate. **7. T. naudiniana.**
Hairs of the stem long, ascending, not closely appressed; leaves usually entire_____**8. T. longifolia.**
Stamens very unequal.
Hairs of the stem closely appressed_____**9. T. schiedeana.**
Hairs of the stem spreading or ascending, not appressed.
Lobes of the calyx equaling or longer than the tube.
Calyx lobes linear_____**10. T. scabriuscula.**
Calyx lobes linear-spatulate_____**11. T. spathulata.**
Lobes shorter than the tube.
Calyx tube 6 mm. long, the lobes 3 mm. long____**12. T. ferrariana.**
Calyx tube 5 mm. long, the lobes 3 to 4 mm. long__**13. T. monticola.**

1. **Tibouchina purpusii** T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 378. 1913.

Hidalgo, Veracruz, and Oaxaca; type collected in the Sierra Madre between Misantla and Naolinco, Veracruz.

Branches densely setose; leaves ovate or oblong-ovate, 3 to 5 cm. long, acuminate, setose, serrulate; flowers in small panicles; calyx tube 5 mm. long, the lobes shorter, linear-lanceolate; petals pink, about 1 cm. long.

2. **Tibouchina galeottiana** (Naud.) Cogn. in DC. Monogr. Phan. **7**: 258. 1891.

Oreocosmus galeottianus Naud. Ann. Sci. Nat. III. **13**: 38. 1850.

Pleroma galeottianum Triana, Trans. Linn. Soc. Bot. **28**: 46. 1871.

Type collected between Tampico, Tamaulipas, and Real del Monte, Hidalgo.

Stems chiefly herbaceous, 20 to 40 cm. high; leaves oblong-lanceolate, 5-nerved, 2 to 4 cm. long, serrulate, setulose beneath along the nerves; calyx tube 5 to 6 mm. long, the lobes 3 to 4 mm. long, subobtuse.

3. **Tibouchina durangensis** Standl., sp. nov.

Type from San Ramón, Durango (*Palmer* 163; U. S. Nat. Herb. no. 571184).

Stems quadrangular, when young covered with very short thick appressed hairs; leaves ovate or ovate-oblong, 3 to 7 cm. long, 1.2 to 3 cm. wide, acute or acuminate, rounded at base, 5-nerved, serrulate, setulose-scabrous, deep green above, pale beneath; flowers in few-flowered terminal panicles; calyx tube 7 mm. long, thinly glandular-setulose with short stout purplish hairs, the lobes oblong-triangular, acute or obtuse, 2.5 to 3 mm. long; petals purple, about 1 cm. long; stamens very unequal, the larger anthers subulate, 7 to 8 mm. long, the connective produced below into a stipe 5 mm. long, the smaller anthers 5 mm. long.

4. **Tibouchina rufipilis** (Schlecht.) Cogn. in DC. Monogr. Phan. **7**: 259. 1891.

Rhexia rufipilis Schlecht. Linnaea **13**: 430. 1839.

Pleroma rufipile Triana, Trans. Linn. Soc. Bot. **28**: 46. 1871.

Veracruz; type from Monte Macultepec, Jalapa.

Slender shrub, the stems rufous-setose; leaves oblong-lanceolate, 3 to 8 cm. long, acuminate, 5-nerved, serrulate, setulose; flowers mostly in 3-flowered cymes; calyx tube 6 mm. long, setose, the lobes linear-spatulate, 8 to 9 mm. long; petals pink, 1.5 cm. long.

5. **Tibouchina mexicana** (D. Don) Cogn. in DC. Monogr. Phan. **7**: 258. 1891.

Melastoma mexicana D. Don, Mem. Wern. Soc. **4**: 290. 1823.

Rhexia tortuosa Humb. & Bonpl. Monogr. Melast. **2**: 17. *pl.* 7. 1823.

Pleroma mexicanum DC. Prodr. **3**: 152. 1828.

Sinaloa to Oaxaca and Veracruz.

Shrub, 1 meter high or less, the branches setose-strigose; leaves lanceolate or linear-lanceolate, 1 to 6 cm. long, attenuate, 3-nerved, entire or serrulate, setulose; flowers solitary or cymose; lobes of the calyx about as long as the tube; petals 1 cm. long, white or pink.

6. **Tibouchina bourgaeana** Cogn. in DC. Monogr. Phan. **7**: 264. 1891.

Tibouchina aliena T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 58. 1914.

Tepic to Veracruz and Chiapas; type from Valley of Córdoba, Veracruz. Central America.

Shrub, 1.5 meters high or less, the branches setose-strigose; leaves lanceolate or lance-oblong, 4 to 11 cm. long, attenuate, 5-nerved, serrulate, appressed-setose; ffowers numerous, in dense or lax cymes; calyx tube 2.5 to 4 mm. long,

the lobes linear-subulate, 1.5 to 2 mm. long (in anthesis; longer in fruit); petals 4 to 5 mm. long, white or pink. "Entrodelia" (Veracruz); "talchinol," "cirín," "largona," "hierba del tabardillo" (El Salvador).

7. **Tibouchina naudiniana** (Decaisne) Cogn. in DC. Monogr. Phan. **7**: 264. 1891.

Chaetogastra naudiniana Decaisne, Rev. Hort. **1847**: 86. 1847.

Pleroma naudinianum Triana, Trans. Linn. Soc. Bot. **28**: 46. 1871.

Oaxaca.

Leaves narrowly lanceolate, 3 to 7 cm. long, serrulate, short-pilose; calyx sparsely setulose, the tube 2.5 mm. long, the lobes 2.5 to 3 mm. long; petals pink, 8 to 12 mm. long.

8. **Tibouchina longifolia** (Vahl) Baill. Adansonia **12**: 74. 1877.

Rhexia longifolia Vahl, Eclog. Amer. **1**: 39. 1796.

Pleroma longifolium Triana, Trans. Linn. Soc. Bot. **28**: 45. 1871.

Reported from Veracruz, Oaxaca, Tabasco, and Yucatán. West Indies; Central and South America.

Shrub, 1.5 meters high or less; leaves lanceolate or oblong, 5 to 10 cm. long, attenuate, appressed-pilose; flowers in lax or dense cymes; calyx setulose, the tube 3 mm. long, the lobes 3 to 4 mm. long; petals white or pink, 5 to 6 mm. long. "Mosqueta silvestre" (Guatemala); "entrodelia" (Veracruz).

9. **Tibouchina schiedeana** (Schlecht. & Cham.) Cogn. in DC. Monogr. Phan. **7**: 261. 1891.

Rhexia schiedeana Schlecht. & Cham. Linnaea **5**: 565. 1830.

Pleroma schiedeanum Triana, Trans. Linn. Soc. Bot. **28**: 46. 1871.

Veracruz and Oaxaca; type from Río Talea. Guatemala.

Shrub; leaves lanceolate or ovate-oblong, 3 to 5 cm. long, acuminate, entire or serrulate, appressed-setose; cymes few-flowered, dense; calyx densely setose, the tube 4 mm. long, the lobes 2 to 3 mm. long, linear-subulate; petals white or pink, 4 to 7 mm. long.

10. **Tibouchina scabriuscula** (Schlecht.) Cogn. in DC. Monogr. Phan. **7**: 262. 1891.

Rhexia scabriuscula Schlecht. Linnaea **13**: 431. 1891.

Oaxaca and probably in Veracruz.

Branches spreading-pilose; leaves oblong-lanceolate, 5 to 8 cm. long, serrulate, setulose above, pilosulous beneath; panicles corymbiform; calyx appressed-setulose, the tube 4 to 5 mm. long; petals 15 to 18 mm. long.

11. **Tibouchina spathulata** T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 58. 1914.

Chiapas; type from Cerro del Boquerón.

Branches densely setose; leaves ovate or oblong-ovate, 4 to 6 cm. long, acuminate, 5-nerved, serrulate, densely setulose; cymes few-flowered; calyx lobes in fruit sometimes 15 mm. long; petals purple, 1 cm. long.

12. **Tibouchina ferrariana** Cogn. in DC. Monogr. Phan. **7**: 1176. 1891.

Type from Teziutlán, Puebla.

Stems pilose, long-setose at the nodes; leaves ovate-oblong, 2 to 3.5 cm. long, crenulate-denticulate, pilose above, setulose beneath along the nerves; flowers solitary; calyx spreading-pilose; petals purplish, 8 to 9 mm. long.

13. **Tibouchina monticola** (Naud.) Cogn. in DC. Monogr. Phan. **7**: 263. 1891.

Oreocosmus monticola Naud. Ann. Sci. Nat. III. **13**: 38. 1849.

Colima to Oaxaca. Costa Rica.

Shrub; leaves oblong or oblong-ovate, 2 to 6 cm. long, acuminate, serrulate or subentire, pilose; flowers solitary or cymose; calyx long-pilose; petals purplish, 1 cm. long.

10. MONOCHAETUM Naud. Ann. Sci. Nat. III. 4: 48. 1845.

Shrubs, variously pubescent; leaves entire, 3 to 7-nerved; flowers usually terminal, cymose or solitary, few, pink, purple, or violet, 4-parted; calyx hairy the lobes ovate or lanceolate, equaling or shorter than the tube; petals obovate; stamens unequal, the anthers elongate-linear or subulate, the larger ones with a porrect, usually elongate appendage at base, the connective not produced at base; capsule 4-celled; seeds curved or coiled.

Hairs of the stems finely plumose and spreading----------1. **M. pulchrum.**
Hairs not plumose or, if so, appressed.
Pubescence of the young stems appressed, or the stems glabrous.
Stems glabrous except at the nodes----------2. **M. pringlei.**
Stems with appressed hairs.
Leaves oblong-linear----------3. **M. angustifolium.**
Leaves lanceolate or ovate.
Leaves short-petiolate, appressed-setose on the upper surface; calyx lobes shorter than the tube----------4. **M. deppeanum.**
Leaves long-petiolate, mostly glabrous on the upper surface; calyx lobes equaling or longer than the tube----------5. **M. alpestre.**
Pubescence of the young stems spreading.
Pubescence of stems of gland-tipped hairs----------6. **M. bracteolatum.**
Pubescence of stems eglandular.
Lobes of the calyx longer than the tube----------7. **M. candollei.**
Lobes equaling or shorter than the tube.
Calyx with gland-tipped hairs----------8. **M. floribundum.**
Calyx with glandless hairs----------9. **M. calcaratum.**

1. **Monochaetum pulchrum** Decaisne, Rev. Hort. III. 2: 101. *f.* 6. 1848.
Monochaetum plumosum Naud. Ann. Sci. Nat. III. 14: 160. 1850.
Monochaetum pulchellum Naud Ann. Sci. Nat. III. 14: 161. 1850.
Veracruz and Oaxaca.

Branches stout, densely plumose-hirsute with brownish hairs; leaves short-petiolate, oblong or ovate, 3 to 6 cm. long, 5 or 7-nerved, acute, densely covered with stellate and with appressed plumose hairs; calyx lobes shorter than the tube; petals 1 cm. long.

2. **Monochaetum pringlei** Rose, Contr. U. S. Nat. Herb. 8: 327. *pl.* 72. 1905.
Morelos; type from Cuernavaca.

Shrub, a meter high or less, the branches setose only at the nodes; leaves linear-lanceolate, 2 to 4 cm. long, 3 to 6 mm. wide, attenuate, 3-nerved, ciliate, glabrous above, sparsely appressed-setose beneath along the nerves; flowers terminal, solitary; calyx appressed-setose with eglandular hairs; petals purplish, about 1.5 cm. long.

3. **Monochaetum angustifolium** Cogn. in DC. Monogr. Phan. 7: 1181. 1891.
Type collected between Piletas and San Miguel, near Jalapa, Veracruz, altitude 1,800 to 1,900 meters.

Branches slender, setose at the nodes, elsewhere appressed-setulose; leaves 2 to 3.5 mm. wide, appressed-setulose beneath along the nerves, 3-nerved;

flowers terminal, solitary; calyx appressed-setulose, the tube 8 mm. long, the lobes 5 to 6 mm. long; petals pink, 1 cm. long.

4. **Monochaetum deppeanum** (Schlecht. & Cham.) Naud. Ann. Sci. Nat. III. 4: 165. 1850.

Rhexia deppeana Schlecht. & Cham. Linnaea 5: 566. 1830.

Monochaetum triplinerve Naud. Ann. Sci. Nat. III. 4: 51. 1845.

Veracruz and Chiapas. Guatemala.

Slender shrub, 1.2 meters high or less, the branches densely appressed-setulose; leaves 1 to 2.5 cm. long, 3 to 6 mm. wide; flowers terminal, usually solitary; calyx appressed-setulose; petals about 1 cm. long, red-purple.

5. **Monochaetum alpestre** Naud. Ann. Sci. Nat. II. 4: 50. 1845.

Monochaetum naudinianum Neum. Rev. Hort. 1861: 211. 1861.

Oaxaca. Guatemala.

Slender shrub, the branches sparsely setulose, especially at the nodes; leaves ovate or ovate-oblong, 1 to 1.5 cm. long, 5 to 8 mm. wide, acute, pale beneath, ciliate; calyx sparsely setulose; petals 1.5 to 2 cm. long.

6. **Monochaetum bracteolatum** Triana, Trans. Linn. Soc. Bot. 28: 64. 1871.

Reported from Dos Puentes. Panama.

Branches sparsely glandular-hirtellous; leaves oblong-lanceolate, 5-nerved, 3 to 5 cm. long, sparsely setulose; calyx sparsely setulose; petals 7 to 8 mm. long.

7. **Monochaetum candollei** Cogn. in DC. Monogr. Phan. 7: 396. 1891.

Type from Mount Orizaba and Vaquería del Jacal, Veracruz, altitude 3,300 meters.

Branches subglabrate, setose at the nodes; leaves long-petiolate, oblong-lanceolate, 2 to 3.5 cm. long, 6 to 10 mm. wide, sparsely setose, ciliate, triplinerved; calyx glandular-setulose; petals pink, 12 to 14 mm. long.

8. **Monochaetum floribundum** (Schlecht.) Naud. Ann. Sci. Nat. III. 14: 165. 1850.

Rhexia floribunda Schlecht. Linnaea 13: 431. 1839.

Monochaetum rivulare Naud. Ann. Sci. Nat. III. 4: 50. 1845.

Veracruz, Oaxaca, and Chiapas. Central America.

Shrub, the branches densely hirsute; leaves short-petiolate, oblong, lance-oblong, or ovate-oblong, 1.5 to 5.5 cm. long, setose; flowers in few-flowered cymes; petals 7 to 8 mm. long, pink or white. "Entrodelia" (Veracruz).

9. **Monochaetum calcaratum** (DC.) Triana, Trans. Linn. Soc. Bot. 28: 63. 1871.

Arthrostemma calcaratum DC. Prodr. 3: 138. 1828.

Monochaetum ensiferum Naud. Ann. Sci. Nat. III. 4: 50. 1845.

Monochaetum candolleanum Naud. Ann. Sci. Nat. III. 4: 50. 1845.

Monochaetum oliganthum Naud. Ann. Sci. Nat. III. 14: 159. 1850.

Veracruz and Oaxaca, and perhaps elsewhere.

Branches sparsely setulose; leaves short-petiolate, lanceolate, 1.5 to 3 cm. long, 3 to 7 mm. wide, triplinerved, sparsely setulose; flowers solitary; calyx densely appressed-setulose; petals 1.5 cm. long, pink or purple.

12. CALYPTRELLA Naud. Ann. Sci. Nat. III. 18: 115. 1852.

1. **Calyptrella galeottii** Naud. Ann. Sci. Nat. III. 18: 115. 1852.

Type from mountains of Oaxaca. Costa Rica.

Tree (?); leaves ovate-oblong or elliptic, 10 to 20 cm. long, 6 to 10 cm. wide, shortly obtuse-acuminate, entire, 5 or 7-nerved, glabrous; flowers usually 6-parted, in open terminal panicles 10 to 30 cm. long, puberulent; limb of the calyx calyptriform, circumscissile; petals 4 mm. long.

13. **TRIOLENA** Naud. Ann. Sci. Nat. III. **15**: 328. 1851.

1. **Triolena scorpioides** Naud. Ann. Sci. Nat. III. **15**: 328. 1851.
Triolena radicans T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 379. 1913.
Veracruz and Chiapas.

Plants herbaceous, ascending, the stems simple; leaves long-petiolate, oblong or oblong-ovate, 5.5 to 13 cm. long, acute, undulate-dentate, 5 or 7-nerved, emarginate and unequal at base, setose above, hirtellous beneath along the nerves; flowers 5-parted, in long-pedunculate scorpioid racemes; calyx turbinate, furfuraceous-puberulent, the lobes short; petals pink, 5 to 6 mm. long; capsule 3-valvate, included in the finally 3-winged calyx.

It is possible that *T. radicans* is a distinct species, but the material at hand affords no basis for such a belief.

14. **LEANDRA** Raddi, Att. Soc. Ital. Sci. **18**: 385. 1820.

Shrubs or small trees, sometimes glabrous; leaves petiolate, 3 to 9-nerved, entire or denticulate; flowers usually 5-parted, small, in terminal or rarely lateral panicles; calyx tube campanulate or urceolate, the limb dentate; petals narrow, acute; stamens subequal; fruit a small berry.

Leaves abruptly long-decurrent at base_____**1. L. multiplinervis.**
Leaves obtuse to subcordate at base.
Branches of the panicle secund; leaves very densely hirtellous.
2. L. mexicana.
Branches not secund; leaves thinly setulose or glabrate.
Panicles all terminal_____**3. L. melanodesma.**
Panicles terminal at first but becoming lateral_____**4. L. cornoides.**

1. **Leandra multiplinervis** (Naud.) Cogn. in Mart. Fl. Bras. **14**[4]: 180. 1886.
Clidemia multiplinervis Naud. Ann. Sci. Nat. III. **17**: 358. 1852.
Oxymeris multiplinervis Triana, Trans. Linn. Soc. Bot. **28**: 94. 1871.
Type from Zacualpan (Chiapas?). Guatemala; Brazil.

Shrub or small tree, the branches short-setulose; leaves oblong-ovate, 10 to 20 cm. long, long-acuminate, 5 or 7-nerved, subentire, sparsely setulose above, hirtellous beneath; panicles narrow, becoming lateral; calyx setulose, the tube 4 mm. long; petals pink, 4 mm. long.

2. **Leandra mexicana** (Naud.) Cogn. in Mart. Fl. Bras. **14**[4]: 77. 1886.
Clidemiastrum mexicanum Naud. Ann. Sc. Nat III. **18**: 87. 1852.
Tabasco and Oaxaca. Central America and Colombia.

Shrub, 2 meters high, the branches densely pilose; leaves ovate, 10 to 18 cm. long, acuminate, cordate at base, denticulate; panicles terminal, the flowers 7-parted, sessile; calyx tube 2 to 2.5 mm. long, the teeth 0.5 to 0.8 mm. long; fruit globose, 3 to 5 mm. in diameter.

This species was listed by Hemsley as *Oxymeris heterobasis* Triana.

3. **Leandra melanodesma** (Naud.) Cogn. in Mart. Fl. Bras. **14**[4]: 73. 1886.
Clidemia melanodesma Naud. Ann. Sci. Nat. III. **17**: 353. 1852.
Oxymeris melanodesma Triana, Trans. Linn. Soc. Bot. **28**: 92. 1871.
Veracruz and Oaxaca. Guatemala to Ecuador.

Shrub, 2 to 4 meters high, the branches furfuraceous-puberulent; leaves ovate or ovate-oblong, 8 to 12 cm. long, acuminate, rounded or subcordate at base, 7-nerved, denticulate, setulose or scaberulous above, furfuraceous beneath; panicles many-flowered, the flowers short-pedicellate; calyx tube 2.5 to 3 mm. long, the lobes minute; petals white or pink, 3 to 4 mm. long. "Teshuate" (Veracruz.).

L. melanodesma sagittata (Naud.) Cogn.[1] is a form in which the basal lobes of the leaves are acute and auricle-like. It was described from Oaxaca and is reported also from Veracruz and Guatemala. It was listed by Hemsley as *Oxymeris subseriata* Triana.

4. **Leandra cornoides** (Schlecht. & Cham.) Cogn. in Mart. Fl. Bras. 14[4]: 76. 1886.

Melastoma cornoides Schlecht. & Cham. Linnaea **5**: 563. 1830.
Cremanium aschenbornianum Schauer, Linnaea **20**: 734. 1847.
Sagraea haeretica Naud. Ann. Sci. Nat. III. **18**: 100. 1852.
Oxymeris cornoides Triana, Trans. Linn. Soc. Bot. **28**: 93. 1871.
Veracruz, Oaxaca, and Morelos.

Slender shrub, 1 to 4.5 meters high, the branches furfuraceous-puberulent or glabrate; leaves lance-oblong 5 to 12 cm. long, acuminate, 5-nerved, obscurely denticulate, sparsely furfuraceous beneath or glabrous; panicles lax, few-flowered; calyx glabrous or nearly so, the tube 3 mm. long; petals white or pink, 5 to 6 mm. long; fruit violet or black, 4 to 5 mm. in diameter.

15. CONOSTEGIA D. Don, Mem. Wern. Soc. 4: 316. 1823.

Shrubs or small trees, glabrous or pubescent; leaves petiolate, entire or denticulate, 3 or 5-nerved; flowers 5 to 10-parted, small or of medium size, white or pink, in terminal panicles; calyx tube campanulate, the limb caplike, circumscissile at anthesis; petals obtuse; stamens equal; fruit a small berry.

Young branches and petioles setulose-hirsute ..... 1. C. speciosa.
Young branches and petioles glabrous or furfuraceous-tomentose.
  Branches and petioles glabrous or obscurely furfuraceous.
    Buds ovoid or conic ..... 2. C. superba.
    Buds globose or subglobose, rounded at apex ..... 3. C. sphaerica.
  Branches and petioles densely furfuraceous-tomentose.
    Leaves entire or nearly so, green beneath; flowers 6 to 10-parted.
      Buds 14 to 17 mm. long, long-rostrate ..... 4. C. arborea.
      Buds 8 to 10 mm. long, rounded at apex, sometimes apiculate. 5. C. subhirsuta.
    Leaves conspicuously denticulate; often densely stellate-tomentose beneath; flowers 5-parted.
      Buds 9 to 11 mm. long, glabrous ..... 6. C. mexicana.
      Buds 4 to 6 mm. long, tomentose ..... 7. C. xalapensis.

1. **Conostegia speciosa** Naud. Ann. Sci. Nat. III. **16**: 109. 1851.

Reported from Veracruz. Central America, Colombia, and Venezuela.

Branches densely setulose; leaves ovate or oblong-ovate, 10 to 20 cm. long, short-acuminate, rounded or obtuse at base, denticulate, setulose above, stellate-tomentose beneath; buds densely hirsute, 5 to 6 mm. long; petals 6 to 7 mm. long, pink or violet.

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[1] In Mart. Fl. Bras. 14[4]: 74. 1886; *Clidemia sagittata* Naud. Ann. Sci. Nat. III. 17: 359. 1852.

2. Conostegia superba D. Don, Mem. Wern. Soc. 4: 317. 1823.
Conostegia macrophylla Naud. Ann. Sci. Nat. III. 16: 112. 1851.
Conostegia purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 57. 1914.
Veracruz and Chiapas. Central America; Jamaica.

Shrub or small tree, 4 to 5 meters high, the branches glabrous or nearly so; leaves ovate or elliptic-ovate, 15 to 30 cm. long, short-acuminate, rounded or obtuse at base, 5-nerved, entire or nearly so, puberulent beneath along the nerves but elsewhere glabrous; panicles 10 to 15 cm. long; buds glabrous, 6 to 7 mm. long; petals white, 5 to 6 mm. long.

3. Conostegia sphaerica Triana, Trans. Linn. Soc. Bot. 28: 98. 1871.
Michoacán to Chiapas; type from Teotalcingo.

Tree, 10 meters high or less, glabrous throughout; leaves lanceolate to oblong-elliptic, 5 to 17 cm. long, obtusely cuspidate-acuminate, atenuate or acute at base, triplinerved, entire; panicles 3 to 7 cm. long; buds 6 to 8 mm. long; petals white, 3 to 5 mm. long, erose.

4. Conostegia arborea (Schlecht.) Schauer, Linnaea 20: 733. 1847.
Melastoma arboreum Schlecht. Linnaea 13: 424. 1839.
Conostegia galeottii Naud. Ann. Sci. Nat. III. 16: 107. 1851.
Veracruz and Oaxaca; type collected between Tioselo and Jicochimalco.

Tree, 4.5 to 9 meters high; leaves ovate-oblong or elliptic, 10 to 25 cm. long, short-acuminate, obtuse or acute at base, green, thinly furfuraceous-puberulent beneath, 5-nerved; panicles few-flowered, 7 to 10 cm. long; buds thinly puberulent; petals white, 8 to 10 mm. long.

5. Conostegia subhirsuta DC. Prodr. 3: 174. 1828.
Veracruz and Oaxaca. West Indies; Central and South America; type from Havana, Cuba.

Shrub, 2 to 4 meters high; leaves elliptic-oblong, elliptic, or ovate-oblong, 8 to 20 cm. long, abruptly short-acuminate, rounded or obtuse at base, 5-nerved, green, furfuraceous beneath along the nerves; panicles few-flowered, 10 cm. long or less; buds furfuraceous or glabrate; petals white, 7 to 8 mm. long. "Teshuate" (Veracruz).

6. Conostegia mexicana Cogn. in DC. Monogr. Phan. 7: 707. 1891.
Veracruz and Oaxaca; type from Monte Pelado.

Branches furfuraceous or stellate-setulose with rufous hairs; leaves elliptic-oblong, 5 to 10 cm. long, short-acuminate, rounded to acute at base, setulose above, puberulent beneath, especially along the nerves; panicles few-flowered, 5 to 10 cm. long; petals 7 to 8 mm. long.

7. Conostegia xalapensis (Bonpl.) D. Don, Mem. Wern. Soc. 4: 317. 1823.
Melastoma xalapense Bonpl.; Humb. & Bonpl. Monogr. Melast. 1: 126. *pl. 54.* 1816.
Conostegia holosericea D. Don, Mem. Wern. Soc. 4: 317. 1823.
Conostegia minutiflora Rose, Contr. U. S. Nat. Herb. 8: 327. *pl. 71.* 1905.
Sinaloa to Tamaulipas, Veracruz, Tabasco, and Chiapas; type from Jalapa, Veracruz. Central America and Colombia; Cuba.

Shrub or small tree, 1 to 10 meters high; leaves oblong to lanceolate or ovate-oblong, 7 to 20 cm. long, acuminate, rounded to acute at base, stellate-tomentose above or rarely setulose, in age glabrous, pale beneath and covered with a dense stellate tomentum, or rarely glabrate, 5-nerved; panicles dense, 10 cm. long or less; petals pink, 3 mm. long. "Capulincillo" (Puebla, San Luis Potosí, Oaxaca); "nigua" (San Luis Potosí, Puebla); "capulín" (Veracruz, Puebla, Oaxaca); "serita" (Puebla, Oaxaca); "chicab" (Ta-

maulipas); "capiroto" (Nicaragua); "cirín" (El Salvador); "lengua de vaca," "pú," "purré," "escobillo" (Costa Rica); "guabón" (Guatemala); "mora" (Tepic); "pupu" (Sinaloa); "capulín de cotorro," "tecapulín," "teshuate" (Veracruz).

Judging from the number of herbarium specimens at hand, this is by far the most common Melastomaceous plant of Mexico. The form with narrow leaves is *C. lanceolata* Cogn.[1] and *C. minutiflora* Rose, but it grades imperceptibly into the typical form. Some specimens of *C. xalapensis* exhibit a truly remarkable diversity in leaf pubescence. Some of the leaves are, when young, finely tomentose upon the upper surface, and these leaves, even in age, are densely tomentose beneath. Other leaves upon the same branch are thinly setose upon the upper surface, without any trace of tomentum, while the lower surface is green and soon glabrate. Unless one had seen both kinds of leaves upon the same specimen, it would be hard to believe that they belonged to the same species.

The dark blue or purple fruits are edible and of good flavor. They somewhat resemble blueberries (*Vaccinium*) in appearance and are often seen in the markets of Central America.

16. MICONIA Ruiz & Pav. Fl. Peruv. Chil. Prodr. 60. 1794.

Shrubs or small trees; leaves entire or denticulate; inflorescence terminal; flowers small, 4 to 8-parted, white, red, or yellow; calyx urceolate or campanulate, the lobes short; petals oblong or obovate; stamens equal or nearly so; fruit a small berry.

The largest genus of the family, including over 500 species. The fruit, like that of other genera, is edible, and some species yield dyes.

Anthers short, obovoid, oblong, or cuneiform.
Anthers oblong, with a single minute pore at apex.
Flowers secund upon the panicle branches.
Branches long-hirsute----1. M. lacera.
Branches glabrous----2. M. ciliata.
Flowers not secund.
Branches glabrous or furfuraceous-puberulent; leaves acute or rounded at base.
Leaves acute at base; branches glabrate----3. M. glabrata.
Leaves rounded at base; branches densely furfuraceous-puberulent. 4. M. madrensis.
Branches hispid or densely tomentulose; leaves cordate at base.
Branches hispid----5. M. phaeotricha.
Branches stellate-tomentulose----6. M. tepicana.
Anthers cuneiform, truncate at apex and with 2 large pores.
Leaves stellate-furfuraceous beneath along the nerves. 7. M. hemenostigma.
Leaves glabrous beneath.
Leaves triplinerved, the lateral nerves arising above the base of the blade----8. M. rubens.
Leaves 3-nerved, the lateral nerves arising at the base of the blade.
Stigma not dilated----9. M. oligotricha.
Stigma capitate.
Calyx 1.5 mm. long----10. M. glaberrima.
Calyx 2.5 to 3 mm. long----11. M. pinetorum.

[1] In DC. Monogr. Phan. 7: 708. 1891.

Anthers elongate, linear or subulate.
Anthers subulate, mostly 4 to 5 mm. long.
Calyx limb closed in bud, breaking up into irregular lobes.
Leaves long-acuminate---12. **M. mexicana.**
Leaves acute or short-acuminate---13. **M. lauriformis.**
Calyx limb open, truncate or regularly dentate.
Calyx oblong or oblong-cylindric.
Filaments hirtellous; leaves serrulate---14. **M. leucocephala.**
Filaments glabrous; leaves entire---15. **M. dodecandra.**
Calyx campanulate.
Calyx lobes subulate.
Calyx tube 2.5 mm. long---16. **M. anisotricha.**
Calyx tube 5 to 6 mm. long---19. **M. saxicola.**
Calyx lobes rounded.
Petals about 3 mm. long---17. **M. guatemalensis.**
Petals 5 to 8 mm. long---18. **M. erythrantha.**
Anthers linear, usually 3 mm. long or less.
Anthers truncate at apex, the connective not appendaged anteriorly.
20. M. minutiflora.
Anthers narrowed at apex or at least not truncate, the connective appendaged or tuberculate anteriorly.
Flowers spicate---21. **M. triplinervis.**
Flowers paniculate.
Branches of the panicle simple, spikelike.
Leaves petiolate---22. **M. bourgaeana.**
Leaves sessile or nearly so---23. **M. impetiolaris.**
Branches of the panicle usually branched, not spikelike.
Leaves densely whitish-tomentulose beneath.
Leaves mostly 7 to 15 cm. wide, usually denticulate.
24. M. argentea.
Leaves mostly 3 to 7 cm. wide, entire or nearly so.
Leaves shallowly cordate at base---25. **M. albicans.**
Leaves rounded or obtuse at base---26. **M. stenostachya.**
Leaves green beneath, never whitish-tomentulose.
Flowers secund upon the branches.
Leaves quintuplinerved---27. **M. scorpioides.**
Leaves 5-nerved---28. **M. ambigua.**
Flowers not secund.
Leaves glabrous or glabrate beneath in age, when young often minutely stellate-pubescent.
Leaves 3 or 5-nerved.
Leaves large, 7 to 40 cm. wide, submarginate at base.
29. M. calvescens.
Leaves smaller, 4 to 10 cm. wide, acute to rounded at base.
Flowers mostly pedicellate---30. **M. hyperprasina.**
Flowers all sessile or nearly so---31. **M. laevigata.**
Leaves triplinerved or quintuplinerved.
Leaves sessile, or the petioles marginate almost to the base, the blades 7 to 10.5 cm. wide---32. **M. langlassei.**
Leaves conspicuously petiolate, the petioles not winged, the blades mostly 5 cm. wide or less.

Leaves 1.5 to 3 cm. wide, the transverse nerves very prominent_____33. **M. schlechtendalii.**
Leaves mostly 4 to 6 cm. wide, the transverse nerves slender and not very prominent___34. **M. prasina.**
Leaves pilosulous or hirsutulous beneath.
Leaves stellate-tomentose beneath_____35. **M. globulifera.**
Leaves pilose or hirsute beneath with simple hairs.
Leaves very densely hirsute beneath, attenuate at base. 36. **M. nervosa.**
Leaves thinly setulose beneath, rounded to subacute at base.
Young branches appressed-setulose__37. **M. chrysoneura.**
Young branches spreading-setulose___38. **M. ibaguensis.**

1. Miconia lacera (Humb. & Bonpl.) Naud. Ann. Sci. Nat. III. 16: 152. 1851.
Melastoma lacerum Humb. & Bonpl. Monogr. Melast. 1: 9. *pl. 5.* 1816.
Reported from southern Mexico. Central America to Brazil; Martinique.
Shrub, 1 to 2 meters high, the branches covered with very long spreading brown hairs; leaves ovate to oblong-lanceolate, 6 to 15 cm. long, acuminate, rounded or obtuse at base, 3 or 5-nerved, denticulate, setulose; panicles narrow; calyx tube 2 mm. long; petals pink, 3 to 4 mm. long. "Sirín" (Guatemala, Honduras).

2. Miconia ciliata (L. Rich.) DC. Prodr. 3: 179. 1828.
Melastoma ciliatum L. Rich. Act. Soc. Hist. Nat. Paris 1792: 109. 1792.
Melastoma decussatum Vahl, Eclog. Amer. 1: 42. 1796.
Miconia decussata D. Don; Triana, Trans. Linn. Soc. Bot. 28: 121. 1871.
Reported from southern Mexico. Panama to Brazil; West Indies.
Shrub, 3 to 5 meters high; leaves oblong or oblong-lanceolate, 8 to 20 cm. long, short-acuminate, 3-nerved, subserrulate, long-ciliate, glabrous; calyx 2 mm. long; petals pink, 2 to 2.5 mm. long.

3. Miconia glabrata Cogn. in DC. Monogr. Phan. 7: 875. 1891.
Oaxaca and Chiapas; type from Pinotepa, Oaxaca.
Slender shrub; leaves ovate-lanceolate or lance-oblong, 3 to 9 cm. long, long-acuminate, quintuplinerved, entire, glabrous; panicles many-flowered, 3 to 8 cm. long; calyx 1.5 mm. long; petals 2 mm. long.

4. Miconia madrensis Standl., sp. nov.
Tepic and Jalisco; type collected near Santa Teresa, in the Sierra Madre, Tepic (*Rose* 2226; U. S. Nat. Herb. no. 301140).
Young branches densely furfuraceous-puberulent with rufous pubescence, in age glabrate; petioles 0.8 to 1.7 cm. long; leaf blades ovate to ovate-oblong, 4.5 to 7.5 cm. long, 1.5 to 4 cm. wide, acute or short-acuminate, rounded at base, quintuplinerved, entire or remotely and minutely serrulate, glabrate above, minutely and sparsely stellate-puberulent beneath or finally glabrate; panicles 6 to 9 cm. long, many-flowered, the flowers pedicellate, 5-parted; calyx 2 mm. long, sparsely puberulent, the lobes minute, rounded; petals 2 mm. long; anthers oblong, curved; fruit 4 mm. thick.
Pringle 2369, collected near Guadalajara, belongs to this species.

5. Miconia phaeotricha Naud. Ann. Sci. Nat. III. 16: 193. 1851.
Type from mountains of Oaxaca.
Leaves ovate-cordate, 12 to 18 cm. long, 5 or 7-nerved, setose above, hirtellous beneath; panicles 10 to 15 cm. long, the flowers pedicellate; calyx 2.5 to 3 mm. long, hispid; petals pink, 1.5 mm. long.

6. **Miconia tepicana** Standl., sp. nov.

Type collected between Dolores and Santa Gertrudis, Tepic (*Rose* 2058; U. S. Nat. Herb. no. 300958).

Branches subterete, densely stellate-tomentulose; petioles 3 to 5 cm. long; leaf blades cordate-ovate, 13 to 15.5 cm. long, 8 to 8.5 cm. wide, acute, deeply cordate at base, quintuplinerved, entire, glabrous above or nearly so, densely and finely stellate-tomentulose beneath; panicles many flowered, about 14 cm. long, the flowers mostly short-pedicellate; calyx 2.5 mm. long, tomentulose, the lobes minute, obtuse; petals 1.5 mm. long; anthers 1 to 1.5 mm. long.

7. **Miconia hemenostigma** Naud. Ann. Sci. Nat. III. **16**: 230. 1851.

Oaxaca. Guatemala.

Branches furfuraceous-puberulent; leaves oblong to ovate, 12 to 20 cm. long, acuminate, rounded at base, 5-nerved, subentire, green and glabrous above; panicles 8 to 12 cm. long; calyx 2 mm. long, puberulent or glabrate; petals white, 1.5 mm. long.

8. **Miconia rubens** (Swartz) Naud. Ann. Sci. Nat. III. **16**: 169. 1851.

Melastoma rubens Swartz, Prodr. Veg. Ind. Occ. 71. 1788.

Chiapas. Costa Rica and Venezuela; type from Jamaica.

Glabrous shrub, 3 to 4 meters high; leaves oblong or elliptic-oblong, 6 to 16 cm. long, acuminate or abruptly acuminate, acute or obtuse at base, subentire; panicles 4 to 7 cm. long, the flowers short-pedicellate; calyx 2 mm. long; petals white, about 1 mm. long.

9. **Miconia oligotricha** (DC.) Naud. Ann. Sci. Nat. III. **16**: 245. 1851.

Cremanium oligotrichum DC. Prodr. **3**: 193. 1828.

Melastoma glaucocarpum Schlecht. Linnaea **13**: 421. 1839.

Veracruz and perhaps elsewhere.

Leaves broadly oblong, 6 to 10 cm. long, acuminate, rounded at base, minutely denticulate; panicles pyramidal, 5 to 8 cm. long, the flowers pedicellate; calyx 2 mm. long; petals 1 mm. long; fruit blue, 4 mm. in diameter.

10. **Miconia glaberrima** (Schlecht.) Naud. Ann. Sci. Nat. III. **16**: 243. 1851.

Melastoma glaberrimum Schlecht. Linnaea **13**: 421. 1839.

Miconia brachystyla Naud. Ann. Sci. Nat. III. **16**: 230. 1851.

Miconia myriocarpa Naud. Ann. Sci. Nat. III. **16**: 231. 1851.

Veracruz, Oaxaca, and Chiapas; type from Barranca de Tioselo. Central America.

Slender glabrous shrub; leaves lance-oblong or elliptic-oblong, 8 to 12 cm. long, acuminate, obtuse or acute at base, entire or nearly so; panicles pyramidal, 5 to 7 cm. long, the flowers pedicellate; petals white or pink, 1 mm. long; fruit white.

11. **Miconia pinetorum** Naud. Ann. Sci. Nat. III. **16**: 229. 1851.

Morelos, Oaxaca, and Chiapas; type from mountains of Oaxaca.

Shrub or small tree, 2 to 4.5 meters high; leaves elliptic or oblong, 7 to 14 cm. long, acuminate, obtuse or acute at base, obscurely serrulate; panicles 4 to 10 cm. long, the flowers pedicellate; petals white, 1 to 1.5 mm. long.

12. **Miconia mexicana** (Humb. & Bonpl.) Naud. Ann. Sci. Nat. III. **16**: 244. 1851.

Melastoma mexicanum Humb. & Bonpl. Monogr. Melast. **1**: 128. *pl. 55*. 1816.

Miconia tococoides Naud. Ann. Sci. Nat. III. **16**: 127. 1851.

Miconia conostegioides Naud. Ann. Sci. Nat. III. **16**: 127. 1851.

Veracruz and Oaxaca. Guatemala.

Shrub, 2 to 3 meters high; leaves oblong-lanceolate, 8 to 18 cm. long, rounded to acute at base, triplinerved, entire or nearly so, glabrous above, puberulent beneath along the nerves; panicles 10 to 15 cm. long, the flowers pedicellate; calyx 3 to 4 mm. long; petals white or pink, 5 mm. long. "Teshuate" (Veracruz).

13. **Miconia lauriformis** Naud. Ann. Sci. Nat. III. 16: 189. 1851.

Type collected between San Bartolo and Pueblo Nuevo, Chiapas.

Leaves ovate-oblong, 6 to 19 cm. long, rounded or subacute at base, triplinerved, entire, puberulent beneath along the nerves; panicles 5 to 7 cm. long, the flowers short-pedicellate; calyx 3 mm. long; petals pink, 5 to 6 mm. long.

14. **Miconia leucocephala** (DC.) Naud. Ann. Sci. Nat. III. 16: 244. 1851.

Chitonia macrophylla D. Don, Mem. Wern. Soc. 4: 319. 1823.

Diplochita leucocephala DC. Prodr. 3: 177. 1828.

Miconia macrophylla Triana, Trans. Linn. Soc. Bot. 28: 103. 1871. Not *M. macrophylla* Steud. 1844.

Oaxaca and Chiapas. West Indies and South America.

Shrub or tree, 3 to 12 meters high, the branches densely tomentose; leaves broadly elliptic to oblong-ovate, 20 to 30 cm. long, rounded or obtuse and short-acuminate at apex, emarginate at base, 5 or 7-nerved, glabrate above, densely stellate-tomentose beneath; panicles 10 to 30 cm. long; calyx 7 mm. long, tomentose; petals white or pink, 6 to 8 mm. long; fruit about 6 mm. in diameter.

15. **Miconia dodecandra** (Desr.) Cogn. in Mart. Fl. Bras. 14[4]: 243. 1886.

Melastoma dodecandrum Desr. in Lam. Encycl. 4: 46. 1797.

Veracruz, Oaxaca, and Chiapas. West Indies; Central and South America.

Shrub or small tree, sometimes 5 meters high, the branches densely furfuraceous-puberulent; leaves ovate to lance-oblong, 10 to 18 cm. long, acuminate, rounded at base, usually 5-nerved, glabrate above, densely stellate-tomentulose beneath; panicles 10 to 20 cm. long, the flowers pedicellate; calyx 4 to 6 mm. long, canescent-tomentulose; petals white or pink, 5 to 8 mm. long; fruit about 5 mm. in diameter.

Reported by Hemsley as *M. fothergilla* (Humb. & Bonpl.) Naud.

16. **Miconia anisotricha** (Schlecht.) Triana, Trans. Linn. Soc. Bot. 28: 102. 1871.

Melastoma anisotrichon Schlecht. Linnaea 13: 427. 1839.

Cremanium berghesianum Schauer, Linnaea 20: 735. 1847.

Clidemia urticaefolia Naud. Ann. Sci. Nat. III. 17: 354 1852.

Veracruz and Oaxaca; type collected between San Miguel del Soldado and La Joya; a closely related but probably distinct plant occurs in Michoacán or Guerrero.

Branches densely furfuraceous-puberulent and short-hirtellous; leaves ovate-oblong, 6 to 12 cm. long, acuminate, subcordate at base, hirtellous beneath, setulose above, 5 or 7-nerved; panicles 4 to 7 cm. long, the flowers pedicellate; calyx hirtellous, 2.5 mm. long, the teeth 1 mm. long; petals 4 mm. long; fruit black, 4 mm. thick.

17. **Miconia guatemalensis** Cogn. in DC. Monogr. Phan. 7: 758. 1891.

Chiapas. Guatemala; type from Tactic.

Branches densely stellate-puberulent; leaves ovate or ovate-oblong, 6 to 16 cm. long, acuminate, rounded or subcordate at base, 5-nerved, entire or minutely serrulate, hirtellous above, stellate-puberulent beneath; panicles 4 to 8 cm. long, the flowers sessile or nearly so; calyx 2 mm. long, puberulent.

18. **Miconia erythrantha** Naud. Ann. Sci. Nat. III. **16**: 119. 1851.
Clidemia monticola Naud. Ann. Sci. Nat. III. **17**: 341. 1852.
Oaxaca.

Branches furfuraceous; leaves narrowly ovate, 4 to 6 cm. long, acute or subacuminate, rounded or subcordate at base, 5-nerved, entire or undulate-denticulate, setulose above, hirtellous beneath along the nerves; panicles 3 to 5 cm. long, the flowers pedicellate; petals red or pink, 5 mm. long.

19. **Miconia saxicola** T. S. Brandeg. Zoe **5**: 215. 1905.
Sinaloa and Tepic; type from Cerro Colorado, Sinaloa.

Young branches densely furfuraceous-puberulent and glandular-hirtellous; leaves rounded-ovate, 6 to 14 cm. long, 4.5 to 6.5 cm. wide, obtuse or rounded at apex and abruptly short-acuminate, cordate at base, 7-nerved, duplicate-serrulate, densely setulose above, hirtellous beneath; panicles few-flowered, 3 to 4.5 cm. long, the flowers pedicellate; calyx 5 to 6 mm. long, densely fulvous-hirtellous with partly gland-tipped hairs, the teeth 1 to 1.5 mm. long; petals 6, 8 to 11 mm. long.

20. **Miconia minutiflora** (Humb. & Bonpl.) DC. Prodr. **3**: 189. 1828.
Melastoma minutiflorum Humb. & Bonpl. Monogr. Mélast. **1**: 50. *pl. 22*. 1816.
Veracruz, Oaxaca, Chiapas, and Tabasco. West Indies; Central and South America.

Shrub or tree, 2 to 4 meters high; leaves oblong-lanceolate, 8 to 12 cm. long, long-acuminate, rounded to acute at base, 3-nerved, sparsely furfuraceous when young but soon glabrous, usually blackish when dry, entire; panicles 5 to 15 cm. long, the flowers numerous, short-pedicellate, sweet-scented; calyx 1.5 mm. long; petals white, 2 to 2.5 mm. long; fruit 2 to 2.5 mm. in diameter. "Resino" (Costa Rica).

21. **Miconia triplinervis** Ruiz & Pav. Syst. Veg. Peruv. Chil. **1**: 105. 1798.
Reported from Tabasco. Jamaica; Peru.

Leaves broadly lanceolate, 15 to 25 cm. long, long-acuminate, long-attenuate at base, 3-nerved, entire; spikes 10 to 15 cm. long; calyx 2.5 to 3 mm. long; petals white, 2 mm. long.

22. **Miconia bourgaeana** Cogn. in DC. Monogr. Phan. **7**: 772. 1891.
Veracruz; type from Tuspango, near Córdoba.

Shrub, 1 to 2 meters high, the branches furfuraceous; leaves broadly ovate to lance-oblong, 10 to 20 cm. long, long-acuminate, rounded or subcordate at base, 5 or 7-nerved, obscurely denticulate, sparsely setulose above, hirtellous beneath; panicles 6 to 15 cm. long; calyx 2 mm. long, stellate-furfuraceous; petals 2 mm. long.

23. **Miconia impetiolaris** (Swartz) D. Don, Mem. Wern. Soc. **4**: 316. 1823.
Melastoma impetiolare Swartz, Prodr. Veg. Ind. Occ. 70. 1788.
Veracruz. West Indies; Central and South America.

Large shrub or tree, 5 to 8 meters high, the branches tomentose; leaves oblong to broadly obovate, 20 to 50 cm. long, short-acuminate, auriculate at base, 3-nerved or quintuplinerved, undulate-denticulate, glabrate above, stellate-hirtellous beneath; panicles 15 to 25 cm. long, the flowers sessile; calyx 2.5 to 3 mm. long; petals white or pink, 2 mm. long; fruit blue or black, 4 mm. in diameter. "Hoja de pasmo" (Costa Rica); "camasey," "camasey de costilla" (Porto Rico).

24. Miconia argentea (Swartz) DC. Prodr. 3: 182. 1828.

Melastoma argenteum Swartz, Fl. Ind. Occ. 779. 1800.

Veracruz, Oaxaca, and Tabasco. Guatemala to Panama; type from the Mosquito Coast.

Shrub or tree, 3 to 20 meters high, the trunk sometimes 30 cm. in diameter; bark gray; leaves ovate to rounded-elliptic, 10 to 25 cm. long, acute or rounded at apex and abruptly short-acuminate, rounded at base, usually denticulate but sometimes entire, green and glabrate above; panicles 10 to 25 cm. long, the flowers sessile; calyx 1.5 to 2 mm. long; petals 2 mm. long. "Cenizo," "sabano" (Tabasco); "María," "Santa María," "María colorada," "capilote" (Costa Rica); "capirote blanco" (Nicaragua); "sirín cacal" (Guatemala, *Seler*); "cainillo," "canillo," "dos-caras," "papelillo," "mancha-mancha" (Panama); "sirinón" (El Salvador).

The sapwood is described as thick and light brown and the heartwood as slightly darker; the wood is said to be moderately hard, durable, fine-grained, and susceptible of a fair polish.

25. Miconia albicans (Swartz) Triana, Trans. Linn. Soc. Bot. 28: 116. 1871.

Melastoma albicans Swartz, Fl. Ind. Occ. 786. 1800.

Guerrero and Oaxaca. West Indies; Central and South America; type from Jamaica.

Shrub, 1 to 5 meters high, the branches whitish-tomentulose; leaves ovate-oblong, 6 to 13 cm. long, obtuse or acute, 5-nerved, emarginate at base, glabrate above, coriaceous; panicles thyrsiform, 5 to 15 cm. long, the flowers secund; calyx 2.5 to 3 mm. long; petals white, 2.5 mm. long; fruit blue, 4 mm. thick. "Mortiño" (Colombia).

26. Miconia stenostachya DC. Prodr. 3: 181. 1828.

Oaxaca and perhaps elsewhere. Central and South America; type from Brazil.

Shrub, 1 to 3 meters high, the branches whitish-tomentulose; leaves oblong or lance-oblong, 10 to 15 cm. long, acute, 5-nerved, glabrate above; panicles 5 to 15 cm. long, the flowers secund; calyx 3.5 to 4 mm. long; petals white or pink, 3 to 3.5 mm. long; fruit blackish, 5 mm. thick.

27. Miconia scorpioides (Schlecht. & Cham.) Naud. Ann. Sci. Nat. III. 16: 243. 1851.

Melastoma scorpioides Schlecht. & Cham. Linnaea 5: 564. 1830.

Miconia anceps Naud. Ann. Sci. Nat. III. 16: 150. 1851.

Veracruz and Chiapas; type from Cuesta Grande de Chiconquiaco, Veracruz. Central and South America.

Shrub or small tree, sometimes 6 meters high, the branches minutely stellate-puberulent; leaves ovate-oblong to oblong-elliptic, 12 to 25 cm. long, acuminate, attenuate at base, entire, glabrous above, very sparsely and minutely stellate-puberulent beneath; panicles 10 to 25 cm. long; calyx 2 mm. long; petals 2.5 mm. long.

28. Miconia ambigua (Humb. & Bonpl.) DC. Prodr. 3: 189. 1828.

Melastoma ambiguum Humb. & Bonpl. Monogr. Melast. 1: 55. *pl. 25.* 1816.

Veracruz, Puebla, and Chiapas. West Indies; Central and South America; type from Caripe, Venezuela.

Shrub, 2 to 3 meters high, the branches obscurely stellate-puberulent; leaves oblong or oblong-lanceolate, 10 to 20 cm. long, long-acuminate, obtuse or acute at base, glabrate, entire or nearly so; panicles 5 to 14 cm. long; calyx 1.5 to 2 mm. long; petals white, 2.5 to 3 mm. long. "Cirín" (El Salvador).

29. Miconia calvescens DC. Prodr. 3: 185. 1828.

Chiapas. Central and South America; type from Brazil.

Tree, 4 to 6 meters high, the young branches minutely stellate-canescent; leaves oblong to broadly ovate or obovate, 15 to 50 cm. long, 7 to 40 cm. wide, acute or short-acuminate, 5-nerved, entire, glabrate; panicles 20 to 50 cm. long, the flowers sessile; calyx 3 mm. long; petals white, 2 to 2.5 mm. long; fruit 4 mm. thick.

30. Miconia hyperprasina Naud. Ann. Sci. Nat. III. 16: 186. 1851.

Type from Teapa, Tabasco. Central America.

Shrub or small tree, the branches sparsely furfuraceous or glabrate; leaves oblong-lanceolate or oblong-elliptic, 15 to 30 cm. long, acuminate, acute at base, thin, glabrate, repand-crenate or subentire; panicles 7 to 10 cm. long; calyx 3 mm. long; petals white, 2 mm. long.

31. Miconia laevigata (L.) DC. Prodr. 3: 188. 1828.

Melastoma laevigatum L. Sp. Pl. ed. 2. 390. 1762.

Melastoma sylvaticum Schlecht. Linnaea 13: 422. 1839.

Miconia sylvatica Naud. Ann. Sci. Nat. III. 16: 243. 1851.

Guerrero, Oaxaca, Morelos, and Veracruz. West Indies; Central and South America.

Shrub, 1 to 4.5 meters high, the young branches stellate-furfuraceous; leaves oblong or oblong-ovate, 8 to 25 cm. long, acuminate, obtuse or rounded at base, entire or nearly so, glabrate; panicles 5 to 15 cm. long; calyx 3 to 3.5 mm. long, furfuraceous; petals white or pink, 3 to 4 mm. long; fruit blue or blackish, 3 mm. thick. "Totopozole," "tezhuate" (Oaxaca, *Reko*); "camasey" (Porto Rico); "teshuate," "ojo de gato" (Veracruz); "cirín" (El Salvador).

32. Miconia langlassei Standl., sp. nov.

Type from the Sierra Madre of Michoacán or Guerrero (*Langlassé* 845; U. S. Nat. Herb. no. 386227).

Tree, 5 to 6 meters high, the young branches glabrate; leaves elliptic-oblong or ovate-oblong, 17 to 23 cm. long, 8 to 10.5 cm. wide, apiculate, abruptly decurrent nearly to the base of the petiole, thin, glabrate, triplinerved, the lateral nerves remote from the margin; panicles about 20 cm. long, broadly pyramidal, the branches arcuate-ascending, the flowers 5-parted, mostly sessile; calyx 2 mm. long, minutely puberulent, repand-dentate; petals white, 2 mm. long; style 6 to 7 mm. long.

To this species may be referred, for the present, *Goldman* 731, from Jaltipám, Veracruz. The specimen is in every way like the type of *M. langlassei* except that the leaf blades are rounded and auriculate at base. Similar variation is exhibited by *M. pteropoda* Benth., a closely related species.

33. Miconia schlechtendalii Cogn. in DC. Monogr. Phan. 7: 804. 1891.

Veracruz: type material from Hacienda de la Laguna and Misantla.

Young branches furfuraceous-puberulent; leaves narrowly lanceolate, 6 to 14 cm. long, acute or acuminate, acute at base, obscurely denticulate, glabrate; panicles 3 to 7 cm. long, narrow, dense, the flowers sessile; calyx 2.5 mm. long; petals white, 2 mm. long; fruit black.

This was listed by Hemsley as *M. maximiliana* DC. It is probably not distinct from *M. prasina*.

34. Miconia prasina (Swartz) DC. Prodr. 3: 188. 1828.

Melastoma prasinum Swartz, Prodr. Veg. Ind. Occ. 69. 1788.

Oaxaca and Chiapas. West Indies; Central and South America.

Shrub, 3 to 5 meters high, the branches puberulent; leaves oblong or lance-oblong, 7 to 20 cm. long, acute or acuminate, acute or obtuse at base, entire or nearly so, glabrate; panicles 5 to 15 cm. long, the flowers sessile; calyx 2.5 to 3.5 mm. long; petals white or pale pink, 2 to 3 mm. long; fruit black-purple, 4 mm. thick. "Camasey" (Porto Rico).

The plant is said to yield a black dye.

35. Miconia globulifera Naud. Ann. Sci. Nat. III. 16: 139. 1851.

Melastoma globuliflorum Schlecht. & Cham. Linnaea 5: 564. 1830. Not *M. globuliflora* L. Rich. 1792.

Veracruz, Oaxaca, and Chiapas; type from Jalapa, Veracruz.

Shrub, 1 to 2 meters high, the branches densely furfuraceous-tomentose; leaves ovate to ovate-oblong, 10 to 15 cm. long, long-acuminate, rounded or obtuse at base and often oblique, setulose above, densely stellate-tomentose beneath; panicles 5 to 8 cm. long, the flowers sessile, clustered at the ends of the branches; calyx 3 mm. long; petals yellow, 3 mm. long; fruit 5 mm. thick.

The writer has seen no material of *M. liebmannii* Cogn.,[1] which, judging from the description, must be very closely related if not identical. It was described from Oaxaca.

36. Miconia nervosa (Smith) Triana, Trans. Linn. Soc. 28: 111. 1871.

Melastoma nervosum Smith in Rees, Cycl. 23. 1822.

Reported from southern Mexico. Central and South America.

Shrub, 2 meters high, the branches appressed-setulose; leaves ovate or ovate-lanceolate, 10 to 30 cm. long, long-acuminate, setulose above; panicles spiciform, 5 to 15 cm. long, the flowers sessile, densely congested; calyx 4 mm. long; petals red, 3.5 to 4 mm. long.

37. Miconia chrysoneura Triana, Trans. Linn. Soc. Bot. 28: 111. 1871.

Veracruz and Oaxaca; type from Jalapa, Veracruz.

Leaves ovate or ovate-lanceolate, 7 to 20 cm. long, acute or acuminate, acute to rounded at base, appressed-setulose or hirtellous with yellowish hairs, entire or nearly so, septemplinerved; panicles 5 to 10 cm. long, the flowers sessile, clustered at the ends of the branches; calyx 3 mm. long; petals 3 mm. long.

38. Miconia ibaguensis (Humb. & Bonpl.) Triana, Trans. Linn. Soc. Bot. 28: 110. 1871.

Melastoma ibaguense Humb. & Bonpl. Monogr. Melast. 1: 105. *pl. 45.* 1816.

Melastoma lineatum Schlecht. Linnaea 13: 423. 1839.

Veracruz and Oaxaca. Cuba; Central and South America.

Shrub, 1 to 5 meters high; leaves oblong or lance-oblong, 8 to 15 cm. long, acute or acuminate, rounded or obtuse at base, quintuplinerved, minutely serrulate or entire, setulose or glabrate above; panicles 5 to 10 cm. long, the flowers sessile; calyx 3 mm. long; petals white or yellow, 2.5 to 3 mm. long.

DOUBTFUL SPECIES

MICONIA MAGNIFICA Triana, Trans. Linn. Soc. Bot. 28: 131. 1871. Described from cultivated plants which were believed to be of Mexican origin.

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[1] In DC. Monogr. Phan. 7: 821. 1891.

17. HETEROTRICHUM DC. Prodr. 3: 173. 1828.

Shrubs with hispid-setose stems; leaves large, petiolate, usually 7-nerved, entire or serrulate; flowers 4 to 9-parted, chiefly in terminal panicles; calyx tube campanulate; petals obovate, obtuse, white or pink; stamens equal; fruit baccate.

Leaves densely stellate-pubescent beneath; flowers 8-parted, the panicles few-flowered ..... 1. H. octonum.
Leaves without stellate pubescence; flowers 4 or 5-parted, the panicles many-flowered ..... 2. H. scopulinum.

1. Heterotrichum octonum (Humb. & Bonpl.) DC. Prodr. 3: 173. 1828.
Melastoma octonum Humb. & Bonpl. Monogr. Melast. 1: 7. *pl. 4.* 1816.
Oaxaca, Chiapas, and Tabasco. Cuba; Central and South America.

Shrub, 2 to 3 meters high, the branches long-setose and stellate-tomentulose; leaves broadly ovate, 7 or 9-nerved, 10 to 20 cm. long, acuminate, cordate at base, denticulate, setose above; calyx tube 4 to 5 mm. long, the lobes 2 to 3 mm. long; petals white, 8 to 9 mm. long; fruit 7 to 8 mm. long.

Many of the inflorescences are axillary or lateral in this species.

2. Heterotrichum scopulinum T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 187. 1915.

Type from Cerro del Boquerón, Chiapas.

Shrub, 1 meter high, the branches setose; leaves very broadly ovate, 10 to 18 cm. long, 7-nerved, acuminate, cordate at base, denticulate, setose above, furfuraceous-villosulous beneath along the nerves; calyx tube 2.5 mm. long, hirtellous; petals pink, 3 mm. long; fruit 4 to 5 mm. in diameter.

18. OSSAEA DC. Prodr. 3: 168. 1828.

1. Ossaea micrantha (Swartz) Macfad. Fl. Jam. 2: 49. 1850.
Melastoma micranthum Swartz, Prodr. Fl. Ind. Occ. 71. 1788.
Chiapas. Central and South America; type from Jamaica.

Slender shrub, 2 to 3 meters high, the branches stellate-puberulent or glabrate; leaves petiolate, oblong or lance-oblong, acuminate, acute at base, quintuplinerved, entire, glabrate; flowers 4-parted, in lax axillary panicles; calyx 2 mm. long, minutely denticulate; petals white, lanceolate, acute, 3 mm. long; fruit baccate, subglobose, 8-costate.

19. MAIETA Aubl. Pl. Guian. 1: 443. 1775.

1. Maieta setosa (Triana) Cogn. in Mart. Fl. Bras. 14[4]: 462. 1888.
Calophysa setosa Triana in Seem. Journ. Bot. 5: 209. 1867.
Veracruz, Oaxaca, and Chiapas. Central America; type from Chontales, Nicaragua.

Shrub, 2 meters high, the stems densely covered with long stiff retrorse or spreading bristles; leaves petiolate, the petiole bearing at the apex a large bladderlike bilobate appendage; leaf blades oblong-ovate or broadly elliptic-ovate, 7 or 9-nerved, 10 to 25 cm. long, acute, subcordate at base, long-setose; flowers 3 or 4-parted, in slender-pedunculate axillary cymes; calyx tube 2 mm. long, furfuraceous, the limb shallowly lobate, long-setose; buds bright red; petals pink, oblong, 3 mm. long; fruit baccate, 3 mm. in diameter.

There is little doubt that *Tococa vesiculosa* DC. is the same plant, and that the proper name for this species is *Maieta vesiculosa* (DC.) Cogn.[1] DeCan-

[1] In Mart. Fl. Bras. 14[4]: 463. 1888; *Tococa vesiculosa* DC. Prodr. 3: 166. 1828; *Calophysa vesiculosa* Triana, Trans. Linn. Soc. Bot. 28: 140. 1871.

dolle's description was based upon one of Sessé and Mociño's plates,[1] which illustrates a plant agreeing well with *Maieta setosa* except that the bristles of the stem are ascending rather than recurved.

20. CLIDEMIA D. Don, Mem. Wern. Soc. 4: 306. 1823.

Shrubs, densely hairy; leaves petiolate, 3 to 7-nerved; entire or dentate; flowers 4 to 6-parted, small, variously arranged; calyx tube urceolate, the lobes short or elongate, interior lobes often developed within the outer lobes; petals oblong or obovate, obtuse; stamens equal or nearly so; fruit a small berry.

Flowers 4-parted, glomerate in the axils and sessile----------1. C. rubra.
Flowers 5-parted, spicate, cymose, or paniculate, usually pedicellate.
  Flowers spicate----------2. C. dependens.
  Flowers cymose or paniculate.
    Interior calyx lobes well developed, 1 mm. long or longer.
      3. C. chinantlana.
    Interior calyx lobes obsolete.
      Lobes of the calyx much shorter than the tube--------4. C. deppeana.
      Lobes of the calyx about as long as the tube.
        Hairs of the calyx conspicuously dilated below and stellate; cymes long-pedunculate----------5. C. laxiflora.
        Hairs of the calyx slender, simple; cymes usually sessile or short-pedunculate.
          Leaves broadly rounded or subcordate at base----------6. C. hirta.
          Leaves merely obtuse at base.
            Leaves entire or obscurely crenulate----------7. C. dentata.
            Leaves duplicate-serrulate----------8. C. naudiniana.

1. Clidemia rubra (Aubl.) Mart. Nov. Gen. & Sp. 3: 152. 1832.
Melastoma rubrum Aubl. Pl. Guian. 416. *pl. 161.* 1775.
Sagraea rubra Triana, Trans. Linn. Soc. Bot. 28: 137. 1871.
Guerrero to Oaxaca and Veracruz. Central and South America.

Shrub, 1 meter high; leaves elliptic to ovate-oblong, 5 to 10 cm. long, acute, rounded at base, densely setose-pilose, 5-nerved; calyx tube 3 to 4 mm. long, the lobes 1.5 mm. long; petals red or pink, 3 to 5 mm. long; fruit black, 4 to 5 mm. in diameter.

2. Clidemia dependens D. Don, Mem. Wern. Soc. 4: 307. 1823.
Melastoma spicatum Aubl. Pl. Guian. 423. *pl. 165.* 1775.
Clidemia spicata DC. Prodr. 3: 159. 1828. Not *C. spicata* D. Don, 1823.
Michoacán to Oaxaca and Veracruz. West Indies; Central and South America.

Shrub, 0.5 to 2 meters high, densely setose and stellate-tomentose; leaves ovate or oblong-ovate, 6 to 18 cm. long, acuminate, rounded or subcordate at base, duplicate-dentate, 5 or 7-nerved, setulose; flowers verticillate in the spikes; calyx tube 3 mm. long, the outer lobes 3 to 4 mm. long; petals 4 mm. long, greenish white or pink; fruit blue-black, edible.

3. Clidemia chinantlana (Naud.) Triana, Trans. Linn. Soc. Bot. 28: 135. 1871.
Staphidium chinantlanum Naud. Ann. Sci. Nat. III. 17: 318. 1852.
Type from Chinantla, Oaxaca.

Leaves ovate, 10 to 15 cm. long, 5 to 8 cm. wide, acuminate, rounded or subcordate at base, 7-nerved, denticulate, hirtellous above; panicles pyramidal,

[1] DC. Calq. Dess. Fl. Mex. *pl. 336.*

4 to 5 cm. wide; calyx tube 3 to 4 mm. long, the outer lobes 2 mm. long; petals white, 3 mm. long.

4. **Clidemia deppeana** Steud. Nom. Bot. ed. 2. 384. 1840.

Melastoma petiolare Schlecht. & Cham. Linnaea **5**: 562. 1830. Not *M. petiolare* Mill. 1768.

Staphidium lindenianum Naud. Ann. Sci. Nat. III. **17**: 314. 1852.

Staphidium gracile Naud. Ann. Sci. Nat. III. **17**: 314. 1852.

Clidemia petiolaris Triana, Trans. Linn. Soc. **28**: 135. 1871.

Veracruz, Oaxaca, Tabasco, and Yucatán; type from Hacienda de la Laguna, Veracruz. Central America.

Slender shrub, the branches setose; leaves 5-nerved, ovate or ovate-oblong, 6 to 15 cm. long, acuminate, rounded or subcordate at base, crenate-denticulate, setose-pilose; cymes lax, few-flowered; calyx glandular-hirsute, the tube 3 mm. long, the lobes 1 to 1.5 mm. long; petals pink, 4 to 5 mm. long; fruit 5 to 6 mm. in diameter.

5. **Clidemia laxiflora** (Schlecht.) Walp.; Naud. Ann. Sci. Nat. III. **17**: 376. 1852.

Melastoma laxiflorum Schlecht. Linnaea **13**: 426. 1839.

Tepic to Veracruz; type from Hacienda de la Laguna, Veracruz. Central America.

Branches densely spreading-setulose; leaves slender-petiolate, ovate or elliptic-ovate, 8 to 13 cm. long, acuminate, rounded at base, 5-nerved, densely setose with long slender fulvous hairs, denticulate or subentire; cymes 3 to 9-flowered, long-pedunculate, the flowers all or chiefly sessile; calyx densely covered with long yellow subulate hairs, the tube 3 to 4 mm. long, the lobes linear, 3 to 5 mm. long; petals 6 to 8 mm. long; fruit black.

6. **Clidemia hirta** (L.) D. Don, Mem. Wern. Soc. **4**: 309. 1823.

Melastoma hirtum L. Sp. Pl. 390. 1753.

Staphidium chrysanthum Naud. Ann. Sci. Nat. III. **17**: 310. 1852.

Veracruz, Oaxaca, and Tabasco. West Indies; Central and South America.

Shrub, 0.5 to 1.5 meters high, the stems setose and stellate-puberulent; leaves ovate or broadly ovate, 5 to 10 cm. long, acuminate, entire or crenulate, 5 or 7-nerved, setose; calyx tube 5 mm. long, the lobes about 4 mm. long; petals white, pink, or yellow, 8 to 10 mm. long; fruit blackish, 6 to 7 mm. long. "Camacey," "camacey peludo" (Porto Rico); "grosella azulada" (Nicaragua); "mortiño" (Colombia), "peluda" (El Salvador).

The fruit is sweet and edible.

Clidemia serrulata (Schlecht.) Triana,[1] the type of which came from Huitamalco, although maintained as distinct by Cogniaux, appears scarcely distinguishable from *C. hirta* and *C. naudiniana*, which are closely related to each other. It is doubtful, also, whether *C. dentata* is a distinct species.

7. **Clidemia dentata** D. Don, Mem. Wern. Soc. **4**: 308. 1823.

Oaxaca and Chiapas. Central America to Peru.

Shrub, 4 meters high or less, the branches setose-hirsute; leaves oblong to oblong-ovate, 6 to 17 cm. long, long-acuminate, 5-nerved, unequal at base, setulose; cymes few-flowered; calyx tube 4 mm. long, the lobes 4 to 6 mm. long; petals 6 mm. long, pink or purple; fruit 6 to 7 mm. long.

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[1] Trans. Linn. Soc. Bot. **28**: 135. 1871; *Melastoma serrulatum* Schlecht. Linnaea **13**: 425. 1839; *Staphidium divaricatum* Naud. Ann. Sci. Nat. III. **17**: 315. 1852.

8. **Clidemia naudiniana** Cogn. in DC. Monogr. Phan. 7: 990. 1891.
Staphidium dependens Naud. Ann. Sci. Nat. III. 17: 319. 1852. Not *Clidemia dependens* D. Don, 1823.
Veracruz, Oaxaca, and Tabasco.
Branches setose-hirsute; leaves ovate or lance-oblong, 6 to 15 cm. long, long-acuminate, 5-nerved, setulose; cymes few-flowered; calyx setose, the tube 3 mm. long, the lobes 3 to 4 mm. long; petals white, 4 to 5 mm. long. "Colación" (Tabasco).

21. BELLUCIA Neck. Elem. Bot. 2: 143. 1790.

1. **Bellucia macrophylla** (D. Don) Triana, Trans. Linn. Soc. Bot. 28: 142. 1871.
Blakea macrophylla D. Don, Mem. Wern. Soc. 4: 326. 1823.
Bellucia superba Naud. Ann. Sci. Nat. III. 16: 104. 1851.
Reported from Tabasco; type from Mexico. Guatemala.
Tree; leaves petiolate, ovate or broadly elliptic, 20 to 30 cm. long, abruptly acute, 5-nerved, coriaceous, when young densely tomentulose beneath but soon glabrous, entire; flowers axillary, solitary or fasciculate, long-pedicellate, 8-parted; calyx about 2 cm. broad, the limb divided into several lobes; petals oblong, 2 cm. long; fruit baccate.
A related species, *B. costaricensis* Cogn., is known in Costa Rica as "coronillo."

22. BLAKEA L. Syst. Nat. ed. 10. 1044. 1759.

1. **Blakea purpusii** T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 58. 1914.
Type from Cerro del Boquerón, Chiapas.
Shrub, the branches terete, glabrate; leaves petiolate, broadly elliptic, about 14 cm. long and 9 cm. wide, obtuse or abruptly short-acuminate, 5-nerved, entire, when young densely furfuraceous-tomentose beneath; flowers axillary, long-pedicellate, the calyx subtended by 4 bracts about 1.5 cm. long; calyx tomentose, 6-dentate.

23. TOPOBEA Aubl. Pl. Guian. 476. 1775.

Shrubs, erect or scandent, often epiphytic; leaves petiolate, 3 to 7-nerved, entire, with numerous transverse parallel nerves; flowers 6-parted, axillary or lateral, solitary or fasciculate, pink or white; subtended at base by 4 free or connate bracts; calyx campanulate, truncate or dentate; stamens equal or nearly so, the anthers subulate; fruit baccate,

Leaves 5-nerved; pedicels mostly 5 mm. long or less_____1. T. calycularis.
Leaves 3-nerved; pedicels mostly 10 to 15 mm. long_____2. T. laevigata.

1. **Topobea calycularis** Naud. Ann. Sci. Nat. III. 18: 149. 1852.
Type from Zuluzu, Chiapas. Central America.
Tree, sometimes 12 meters high, the branchlets tetragonous; leaves oblong-elliptic, 8 to 13 cm. long, abruptly caudate-acuminate, acute at base, coriaceous, glabrous; bracts coriaceous, appressed, rounded, 3 to 5 mm. long; calyx 7 to 8 mm. long, truncate and minutely 6-dentate; petals white or pink, ovate, acutish, 8 mm. long.

2. **Topobea laevigata** (Don) Naud. Ann. Sci. Nat. III. 18: 150. 1852.
Blakea laevigata D. Don, Mem. Wern. Soc. 4: 323. 1823.
Melastoma laevigatum Schlecht. Linnaea 13: 428. 1839.

Topobea fragrans Naud. Ann. Sci. Nat. III. 18: 149. 1852.

Veracruz. Guatemala.

Erect shrub, 3.5 meters high, or epiphytic; leaves elliptic-obovate or oblong-obovate, 7 to 13 cm. long, abruptly short-acuminate, attenuate at base, coriaceous, glabrous; bracts rounded, 4 to 5 mm. long; calyx truncate, 7 to 8 mm. long; petals pink, 8 to 10 mm. long, obtuse.

24. MOURIRIA Aubl. Pl. Guian. 452. 1775.

Shrubs or small trees, glabrous throughout; leaves sessile, entire, coriaceous, 1-nerved or pinnate-nerved; flowers small, fasciculate in the axils, 5-parted; calyx limb cupular; petals acute or acuminate; stamens 10, equal; fruit baccate, globose, 1 to 4-seeded.

Leaves conspicuously pinnate-nerved, subcordate at base------1. **M. muelleri.**
Leaves 1-nerved, the lateral nerves obsolete, rounded at base--2. **M. parvifolia.**

1. Mouriria muelleri Cogn. in DC. Monogr. Phan. 7: 1118. 1891.

Oaxaca; type from Trapiche de la Concepción.

Leaves oblong or oblong-ovate, 5.5 to 10 cm. long, acute; peduncles solitary or geminate, 1 or 3-flowered, the pedicels 3 to 10 mm. long; calyx 4 to 5 mm. long, the lobes very short, deltoid; petals ovate, 2 to 3 mm. long; fruit about 1 cm. in diameter. "Yaglancito amarillo" (Oaxaca, *Reko*).

2. Mouriria parvifolia Benth. Bot. Voy. Sulph. 97. *pl. 36.* 1844.

Tres Marías Islands, Tepic. Guatemala to Panama.

Leaves ovate-lanceolate to broadly ovate, 1.5 to 6 cm. long, acute or acuminate; flowers solitary or fasciculate, the pedicels 1 to 4 mm. long; calyx 3 mm. long, the lobes linear-subulate, 3 mm. long; petals 5 mm. long; fruit globose, 8 mm. in diameter. "Camarón," "capulín verde" (El Salvador).

DOUBTFUL SPECIES.

MOURIRIA MEXICANA DC. Prodr. 3: 8. 1828. Description based upon one of Sessé and Mociño's plates.[1] The leaves are shown as petiolate, and the plant probably does not belong to this genus and perhaps not to the family.

124. ONAGRACEAE. Evening-primrose Family.

Shrubs or small trees, or often herbs; leaves opposite or alternate, entire or dentate, estipulate; flowers commonly perfect, mostly axillary, regular or irregular; calyx tube adnate to the ovary and produced beyond it, the limb usually 4-lobate; petals commonly 4, contorted; stamens 1 to 8, the anthers oblong or linear; style filiform, the stigma entire or 4-lobate; fruit dry or fleshy.

Numerous herbaceous plants of the family, representing several genera, occur in Mexico.

Stamens 1 or 2.
  Fertile stamens 2----------1. **DIPLANDRA.**
  Fertile stamen 1.
    Petals subulate, not clawed----------2. **SEMEIANDRA.**
    Petals clawed----------3. **JEHLIA.**

[1] DC. Calq. Dess. Fl. Mex. *pl. 361.*

Stamens 8.

Seeds 1 in each cell of the fruit; ovary imbedded in the flowering branch. **4. BURRAGEA.**

Seeds few or numerous in each cell; ovary free from the flowering branch.

Fruit capsular; seeds winged or hairy.

Seeds each with a tuft of hairs at apex_____**5. ZAUSCHNERIA.**

Seeds winged, not hairy.

Seeds in 2 rows in each cell; flowers large_____**6. HAUYA.**

Seeds in a single row; flowers small_____**7. XYLONAGRA.**

Fruit baccate; seeds neither winged nor hairy_____**8. FUCHSIA.**

1. **DIPLANDRA** Hook. & Arn. Bot. Beechey Voy. 291. 1839.

A single species is known.

1. **Diplandra lopezioides** Hook. & Arn. Bot. Beechey Voy. 291. *pl. 60.* 1839.
Tepic.

Shrub, about 2 meters high, the stems covered with brown flaky bark; leaves opposite, short-petiolate, oblong or oblong-lanceolate, 5 to 9 cm. long, serrate, acute, scabrous-hispidulous; flowers red, in terminal racemes, long-pedicellate, about 1 cm. long; calyx tube very short, the 4 lobes oblong-linear; petals short, obovate; stamens 2; fruit a 4-celled capsule, about 8 mm. long.

2. **SEMEIANDRA** Hook. & Arn. Bot. Beechey Voy. 291. 1839.

Only the following species is known.

1. **Semeiandra grandiflora** Hook. & Arn. Bot. Beechey Voy. 291. *pl. 59.* 1839.
Durango, Sinaloa, Tepic, and Jalisco; type from Tepic.

Slender shrub, about 2 meters high, the branches finely puberulent; leaves opposite, petiolate, ovate or lanceolate, 3 to 10 cm. long, acute or obtuse, serrulate, puberulent; flowers bright red, 3 to 4.5 cm. long, axillary, forming leafy racemes, long-pedicellate; calyx tube ventricose, the 4 lobes linear, 3 of them reflexed, the other erect; petals linear-subulate, half as long as the sepals or shorter; stamens 2; fruit a globose capsule, about 6 mm. long.

3. **JEHLIA** Rose, Contr. U. S. Nat. Herb. **12**: 297. 1909.

A single species is known.

1. **Jehlia grandiflora** (Zucc.) Rose, Contr. U. S. Nat. Herb. **12**: 297. 1909.
Lopezia grandiflora Zucc. Flora **15**: Beibl. 101. 1832.
Lopezia macrophylla Benth. Pl. Hartw. 83. 1841.
Oaxaca and Chiapas; type from "Santiago." Guatemala.

Plants fruticose; leaves opposite, petiolate, oblong-ovate or lance-oblong, 6 to 13 cm. long, acuminate, attenuate or acute at base, serrulate, puberulent or glabrate; flowers bright red, about 2 cm. long, long-pedicellate, axillary, forming dense leafy racemes; calyx tube very short, the 4 lobes lanceolate; petals 4, unequal; stamens 2, one of them sterile; fruit a subglobose capsule, 4-celled, about 8 mm. long.

4. **BURRAGEA** Donn. Smith & Rose, Contr. U. S. Herb. **16**: 297. 1913.

Low shrubs; leaves alternate, entire, petiolate; flowers axillary, sessile; calyx tube very slender, elongate, the 4 sepals reflexed; petals 4; stamens 8, unequal; stigma capitate; ovary imbedded in the stem, 2-celled; capsule

2-celled, 2-seeded, imbedded in the flowering branch and tardily separating from it.

Only two species are known.

Stems puberulent----------1. **B. fruticulosa.**
Stems glabrous----------2. **B. frutescens.**

1. **Burragea fruticulosa** (Benth.) Donn. Smith & Rose, Contr. U. S. Nat. Herb. **16**: 298. 1913.

Gaura fruticulosa Benth. Bot. Voy. Sulph. 15. 1844.

Gongylocarpus fruticulosus T. S. Brandeg. Proc. Calif. Acad. II. **2**: 158. 1889.

Baja California; type from Magdalena Bay.

Plants 30 to 60 cm. high; leaves linear or oblanceolate-linear, 1.5 to 3 cm. long, 1 to 4 mm. wide, acute; calyx tube about 1.5 cm. long; petals 1 cm. long, rose-purple.

2. **Burragea frutescens** (Curran) Donn. Smith & Rose, Contr. U. S. Nat. Herb. **16**: 298. 1913.

Gongylocarpus frutescens Curran, Proc. Calif. Acad. II. **1**: 231. 1888.

Baja California; type from Magdalena Bay.

Shrub, 30 to 60 cm. high, glabrous throughout, the branches usually purple; leaves narrowly oblanceolate, 2 to 3 cm. long, 7 mm. wide or less; calyx tube 2 to 2.5 cm. long; petals 12 mm. long.

5. ZAUSCHNERIA Presl, Rel. Haenk. **2**: 28. 1831.

1. **Zauschneria californica** Presl, Rel. Haenk. **2**: 28. *pl. 52.* 1831.

Zauschneria mexicana Presl, Rel. Haenk. **2**: 29. 1831.

Baja California and Sonora. California to New Mexico; type from Monterey, California.

Plants herbaceous or shrubby, 1.5 meters high or less; leaves sessile, the lower opposite, the upper alternate, lanceolate to ovate, 1.5 to 4 cm. long, acute, entire or denticulate, densely pilose or glabrate; flowers bright red, 2 to 3 cm. long, in leafy spikes; calyx tube funnelform, the limb 4-lobate; petals 4; stamens 8, exserted; fruit a linear 4-celled capsule; seeds each with a tuft of hairs at apex.

A showy plant, sometimes known as "California fuchsia." The species is a variable one, of which several segregates have been described.

6. HAUYA DC. Prodr. **3**: 36. 1828.

REFERENCE: J. D. Smith and J. N. Rose, Contr. U. S. Nat. Herb. **16**: 288–296. 1913.

Shrubs or trees; leaves large, entire; flowers large, axillary, solitary; calyx tube elongate, the lobes narrow; petals 4, sessile; stamens 8; fruit a woody capsule.

Flowers pedicellate.
Calyx lobes short-appendaged at apex.----------1. **H. rusbyi.**
Calyx lobes not appendaged----------2. **H. barcenae.**
Flowers sessile.
Calyx lobes not appendaged----------3. **H. elegans.**
Calyx lobes appendaged----------4. **H. microcerata.**

1. **Hauya rusbyi** Donn. Smith & Rose, Contr. U. S. Nat. Herb. **16**: 291. *f. 48.* 1913.

Guerrero; type from Monte Limón, altitude 1,350 meters.

Small tree; leaves oval-ovate or elliptic-ovate, 6.5 to 12 cm. long, abruptly short-acuminate, rounded at base, pilosulous; calyx tube 3 cm. long, the lobes 4 to 5 cm. long; capsule 3.5 to 4 cm. long, about 8 mm. thick.

2. Hauya barcenae Hemsl. Diag. Pl. Mex. 13. 1878.

Type from Huajuapan, Oaxaca.

Tree, 12 meters high; leaves ovate-rounded, 5 to 6.5 cm. long, acute, rounded at base, puberulent; calyx tube 3.5 cm. long, the lobes of the same length; capsule 5 cm. long.

3. Hauya elegans DC. Prodr. 3: 36. 1828.

Described from Mexico, the locality not known; reported from Hidalgo by Hemsley.

Shrub or tree, sometimes 12 meters high; leaves lanceolate to rounded-ovate, 3.5 to 6 cm. long, acuminate, grayish-velutinous beneath; flowers about 12.5 cm. long; calyx lobes half as long as the tube; petals pink; capsule 3.5 cm. long.

4. Hauya microcerata Donn. Smith & Rose, Bot. Gaz. 52: 46. 1911.

Chiapas. Guatemala; type from Santa Rosa.

Leaves oblong to rounded, 7 to 11 cm. long, obtuse or subacute, velutinous-pilose; calyx tube 8 to 10 cm. long, the lobes 3.5 to 4 cm. long; petals 3 cm. long; capsule 5 cm. long.

7. **XYLONAGRA** Donn. Smith & Rose, Contr. U. S. Nat. Herb. 16: 294. 1913.

The genus consists of a single species.

1. Xylonagra arborea (Kellogg) Donn. Smith & Rose, Contr. U. S. Nat. Herb. 16: 294. 1913.

Oenothera arborea Kellogg, Proc. Calif. Acad. 2: 32. 1859.

Hauya californica S. Wats. Proc. Amer. Acad. 20: 366. 1885.

Hauya arborea Curran, Proc. Calif. Acad. II. 1: 253. 1888.

Dry hillsides, Baja California and the adjacent islands; type from Cedros Island.

Shrub, 0.5 to 1.5 meters high, the branches brown, puberulent when young; leaves alternate, short-petiolate, lanceolate or oblong, 8 to 15 mm. long, entire, puberulent, gland-tipped; flowers racemose, 2 to 2.5 cm. long, bright red; calyx lobes about half as long as the tube; petals red, 5 mm. long; capsule 10 to 12 mm. long, 4-celled.

The shrub is abundant in some localities, forming small thickets. The racemes vary greatly in length, some of them consisting of only two or three flowers and others of as many as a hundred. After fruiting the racemes sometimes develop terminal leafy shoots.

8. **FUCHSIA** L. Sp. Pl. 1191. 1753.

Shrubs or small trees; leaves mostly opposite or verticillate, entire or dentate; flowers small or large, pink, red, or purple, perfect or unisexual, axillary, racemose, or paniculate; calyx tube short or elongate, the limb 4-lobate; petals 4; stamens 8; fruit baccate, 4-celled, few or many-seeded.

Most of the cultivated fuchsias are of South American origin, and some of the South American ones are grown in Mexican gardens, where they are known as "arete," "Adelaida," "flor de arete," "aretillo," "fusia," or "flusia." The fruits are edible, and those of *F. splendens* are said to be used in Guatemala for preserves. Some of the species are reported to have tonic, astringent, and febrifuge properties.

Stamens longer than the petals; flowers large, 3 to 7.5 cm. long.
Flowers 5 to 7.5 cm. long----1. F. fulgens.
Flowers (excluding the ovary) 3 to 3.8 cm. long.
Calyx tube glabrous within, not ventricose above the ovary; petals ovate-rounded----2. F. intermedia.
Calyx tube villosulous within, ventricose above the ovary; petals lance-ovate----3. F. splendens.
Stamens shorter than the petals; flowers small, less than 2 cm. long.
Flowers in terminal panicles, erect----4. F. arborescens.
Flowers axillary, drooping.
Young branches glabrous----5. F. bacillaris.
Young branches variously pubescent.
Calyx tube and ovary glabrous----6. F. microphylla.
Calyx tube and ovary puberulent or pilose (sometimes very inconspicuously so).
Lobes of the calyx nearly or quite as long as the tube.
Lobes longer than the tube; flowers about 6 mm. long; leaves serrulate----7. F. minimiflora.
Lobes equaling or slightly shorter than the tube; flowers 8 to 12 mm. long; leaves mostly entire----8. F. thymifolia.
Lobes of the calyx much shorter than the tube.
Calyx tube obconic----9. F. pringlei.
Calyx tube cylindric.
Calyx hirsute or pilosulous----10. F. chiapensis.
Calyx puberulent.
Leaves serrulate----11. F. minutiflora.
Leaves mostly entire----12. F. parviflora.

1. **Fuchsia fulgens** DC. Prodr. 3: 39. 1828.

Michoacán.

Shrub, 0.3 to 1.2 meters high, with tuberous-thickened roots; leaves long-petiolate, broadly ovate or rounded-ovate, 8 to 17 cm. long, abruptly short-acuminate, rounded or cordate at base, serrulate, thinly pubescent or glabrate; flowers in short racemes, glabrate; calyx lobes 12 to 14 mm. long; petals half as long as the calyx lobes; fruit ellipsoid, 2 cm. long or larger. "Adelaida," "aretillo," "flor de arete."

2. **Fuchsia intermedia** Hemsl. Diag. Pl. Mex. 14. 1878.

Type from Cumbre de Totontepeque, Oaxaca, altitude 3,000 meters. Guatemala.

Shrub, the branchlets puberulent; leaves ovate or cordate-ovate, 10 to 12.5 cm. long, acuminate, obscurely denticulate; flowers axillary, pedicellate, nodding; calyx sparsely puberulent outside, the lobes half as long as the tube; petals a third as long as the calyx lobes.

3. **Fuchsia splendens** Zucc. Flora **1832**[2]: Beibl. 102. 1832.

Chiapas. Guatemala.

Shrub, the branchlets pubescent; leaves broadly ovate or ovate-cordate, 5 to 12.5 cm. long, acuminate, denticulate, pubescent; flowers axillary, nodding; calyx pilosulous, the lobes half as long as the tube; fruit 3.5 cm. long or even larger.

4. **Fuchsia arborescens** Sims in Curtis's Bot. Mag. *pl. 2620.* 1826.

Fuchsia paniculata Lindl. Gard. Chron. **1856**: 301. 1856.

Fuchsia liebmanni Léveillé, Bull. Geogr. Bot. **22**: 24. 1912.

Michoacán to Veracruz and Chiapas. Central America.

Shrub or tree, 1.5 to 6 meters high, glabrous or nearly so; leaves opposite or ternate, oblanceolate or oblanceolate-oblong, 7 to 20 cm. long, acute or acuminate, attenuate at base, entire or serrulate; flowers very numerous, pink or purplish, about 12 mm. long; lobes of the calyx about as long as the tube; fruit subglobose, 1 cm. in diameter. "Don Diego de día," "atexúchil" (Mexico, *Urbina*); "Adelaida" (Veracruz, Oaxaca, *Ramírez*); "aretillo" (Michoacán, *Ramírez*); "chorros" (Jalisco, *Villada*); "flor de arete" (Veracruz, *Ramírez*).

5. **Fuchsia bacillaris** Lindl. Bot. Reg. *pl. 1480.* 1832.

Michoacán to Chiapas; described from cultivated plants of Mexican origin. Guatemala.

Shrub. 1 to 3 meters high, glabrous throughout; leaves slender-petiolate, lanceolate to elliptic, 1.5 to 5 cm. long, obtuse or acute, callous-serrulate, thick; flowers 10 to 12 mm. long; lobes of the calyx equaling or shorter than the tube.

6. **Fuchsia microphylla** H. B. K. Nov. Gen. & Sp. 6: 103. *pl. 534.* 1823.

Fuchsia mixta Hemsl. Diag. Pl. Mex. 15. 1878.

Jalisco to Mexico and Oaxaca; type from Volcán de Jorullo. Central America.

Shrub, 2 meters high or less, the branches puberulent; leaves ovate to rounded, 5 to 20 mm. long, obtuse or acute, serrulate, glabrous or nearly so; flowers 10 to 14 mm. long; lobes of the calyx less than half as long as the tube.

7. **Fuchsia minimiflora** Hemsl. Diag. Pl. Mex. 14. 1878.

Morelos and Chiapas; type from Chiapas.

Shrub, 1.5 to 4.5 meters high; leaves slender-petiolate, ovate, 2.5 to 6.5 cm. long, acuminate, acute at base, sparsely pubescent; flowers puberulent, the calyx lobes with long slender tips.

8. **Fuchsia thymifolia** H. B. K. Nov. Gen. & Sp. 6: 104. *pl. 535.* 1823.

Jalisco to Mexico and Oaxaca; type from Pátzcuaro, Michoacán.

Slender shrub, about a meter high, with puberulent branches; leaves ovate-lanceolate to orbicular, 1 to 5 cm. long, acute to rounded at apex; flowers purplish red, the calyx tube obconic.

9. **Fuchsia pringlei** Robins. & Seat. Proc. Amer. Acad. 28: 106. 1893.

Tepic and Jalisco to Mexico; type from mountains near Pátzcuaro, Michoacán.

Slender shrub, 1 to 2 meters high, the branches puberulent; leaves ovate to rounded, 5 to 25 mm. long, acute to rounded at apex, serrulate or entire, puberulent or glabrate; flowers purplish, 6 to 8 mm. long.

Probably not distinct from *F. thymifolia*.

10. **Fuchsia chiapensis** T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 59. 1914.

Oaxaca and Chiapas; type from Cerro del Boquerón, Chiapas.

Branches pilose or hirsutulous; leaves ovate to rounded-ovate, 1.5 to 3.5 cm. long, obtuse or acute, pilose or pilosulous beneath, serrulate or entire; flowers about 1 cm. long.

11. **Fuchsia minutiflora** Hemsl. Diag. Pl. Mex. 15. 1878.

Michoacán to Chiapas and Veracruz; type from Orizaba. Central America.

Slender shrub, the branches puberulent; leaves ovate-lanceolate to rounded, 8 to 20 mm. long, obtuse or acute, serrulate, glabrous or puberulent; flowers purplish red, 6 to 10 mm. long.

12. **Fuchsia parviflora** Zucc. Abh. Akad. Wiss. München 2: 337. 1831–36.

Michoacán to Mexico and Chiapas. Central America.

Shrub, the branches puberulent; leaves ovate-lanceolate to broadly elliptic, 1 to 5 cm. long, obtuse or acute; flowers polygamous or dioecious, 8 to 15 mm. long. "Sacatinta" (El Salvador).

125. ARALIACEAE. Ginseng Family.

Shrubs or trees, rarely herbs, sometimes epiphytic, the pubescence, if any, chiefly of branched hairs; leaves alternate, simple or compound, stipulate; flowers perfect or unisexual, umbellate or capitate, small, greenish; calyx tube adnate to the ovary, the limb short, truncate or dentate; petals usually 5; stamens as many as the petals; styles as many as the ovary cells; fruit baccate, containing 2 to 7 1-seeded nutlets.

One of the best-known plants of the family is ginseng, *Panax quinquefolium* L., a native of the United States. The fleshy roots are exported to China, where they are highly valued for their supposed medicinal virtues, and the plant has been cultivated rather extensively in the United States to obtain the roots for export.

The English ivy ("hiedra extranjera"), *Hedera helix* L., a slender vine with handsome, dark green, simple leaves, is sometimes cultivated in Mexico.

Petals imbricate; leaves pinnate or bipinnate_____1. **ARALIA.**
Petals valvate; leaves simple or digitately compound.

Endosperm ruminate; flowers capitate; leaves simple or compound.
2. OREOPANAX.

Endosperm not ruminate; flowers umbellate; leaves entire or lobate.
3. GILIBERTIA.

1. ARALIA L. Sp. Pl. 273. 1753.

Shrubs, small trees, or herbs; leaves pinnate or bipinnate, the leaflets toothed; flowers in umbels, these racemose or paniculate, the bracts small; calyx 5-dentate; petals 5, imbricate, greenish; stamens 5; fruit fleshy, composed of usually 5 carpels.

The Mexican species are unarmed, but some of those of other regions are furnished with prickles.

Leaflets glabrous beneath.
Leaves once pinnate; leaflets subcordate at base_____1. **A. scopulorum.**
Leaves mostly bipinnate; leaves obtuse or acute at base____2. **A. regeliana.**
Leaflets pubescent beneath.
Pedicels glabrous_____3. **A. humilis.**
Pedicels pubescent
Leaves usually once pinnate; leaflets serrulate, densely pubescent beneath_____4. **A. pubescens.**
Leaves bipinnate; leaflets sharply serrate, green and very sparsely pubescent beneath_____5. **A. racemosa.**

1. **Aralia scopulorum** T. S. Brandeg. Proc. Calif. Acad. II. 2: 165. *pl.* 8. 1889.

Mountains of Baja California; type from Comondú Canyon.

Shrub, 1 to 4.5 meters high; leaflets 5 or 7, broadly ovate or elliptic, 3 to 6 cm. long, acuminate, usually subcordate at base, coarsely crenate; umbels few, racemose, the pedicels puberulent; petals 3 mm. long; stylopodium conic.

2. **Aralia regeliana** Marchal, Bull. Acad. Brux. II. 47: 73. 1879.

Tamaulipas and San Luis Potosí; type from Victoria, Tamaulipas.

Shrub or small tree; leaflets long-petiolulate, ovate to narrowly lanceolate, 4 to 7 cm. long, long-acuminate, crenate-serrate or subentire, thin; umbels few, long-pedunculate, racemose, the pedicels glabrous; fruit about 5 mm. in diameter.

3. **Aralia humilis** Cav. Icon. Pl. 4: 7. *pl. 313*. 1797.

?*Aralia brevifolia* Marchal, Bull. Acad. Brux. II. 47: 74. 1879.

?*Aralia pinnata* Sessé & Moc. Pl. Nov. Hisp. 48. 1887.

Chihuahua and Sonora to Morelos and Oaxaca. Southern Arizona.

Shrub, 1 to 2.5 meters high, with brown branches; leaves (except the uppermost) bipinnate, the leaflets oblong-ovate to broadly ovate, 2 to 5 cm. long, acuminate, rounded or shallowly cordate at base, serrate or crenate, coarsely pubescent; umbels numerous, paniculate; fruit 4 to 5 mm. in diameter, 5-sulcate.

4. **Aralia pubescens** DC. Cat. Hort. Monsp. 80. 1813.

Sonora to Oaxaca.

Shrub or small tree, with thick corky bark; leaflets 5 to 11, ovate to broadly elliptic, 3 to 6 cm. long, acute or abruptly acuminate, rounded at base, densely and coarsely pubescent; umbels numerous, racemose-paniculate; petals 2 mm. long; fruit about 5 mm. in diameter; styles united to form a slender beak. "Cuajilotillo" (Sinaloa).

It is not certain that the plant described here is the one described by De Candolle as *Aralia pubescens*, but it is a species quite distinct from *A. humilis*. *Aralia pubescens* may be a synonym of *A. humilis*.

5. **Aralia racemosa** L. Sp. Pl. 273. 1753.

Mountains of Chihuahua and Durango. Widely distributed in the United States and Canada.

Plants herbaceous or sometimes woody, 1 to 2 meters high; leaflets broadly ovate, 5 to 15 cm. long, abruptly acuminate, rounded or cordate at base, thin, sharply serrate, the teeth cuspidate-apiculate; umbels numerous, racemose-paniculate; fruit 5 to 6 mm. in diameter, dark purple.

In the United States the plant is known as "American spikenard." The roots are fragrant and have an aromatic sweetish flavor. They have been much used medicinally, chiefly in domestic practice, for their gently stimulant, diaphoretic, and alterative action, particularly in rheumatic, syphilitic, and cutaneous affections. In their properties they resemble sarsaparilla.

DOUBTFUL SPECIES

ARALIA CHILAPENSIS Sessé & Moc. Pl. Nov. Hisp. 48. 1887. Type from Chilapa, Guerrero. The leaflets are said to be glabrous.

2. OREOPANAX Decaisne & Planch. Rev. Hort. 1854: 107. 1854.

Shrubs or trees, sometimes epiphytic; leaves long-petiolate, entire, lobed, or digitately compound; flowers capitate, polygamo-dioecious, the heads racemose or paniculate; calyx entire or nearly so; petals 4 to 7, usually 5, valvate; fruit 2 to 7-celled.

Leaves simple, entire or with a few low teeth.
- Flower heads sessile ---- 1. O. platyphyllum.
- Flower heads pedunculate.
  - Staminate heads 5 to 7-flowered; pistillate heads usually 2-flowered. ---- 2. O. liebmanni.
  - Staminate heads 20 to 50-flowered; pistillate heads 5 to 12-flowered.
    - Leaves glabrous ---- 3. O. capitatum.
    - Leaves stellate-pubescent, densely so beneath ---- 4. O. flaccidum.

Leaves deeply lobed or digitately compound.
Leaves deeply lobed----------5. **O. salvinii.**
Leaves digitately compound.
Leaflets sessile; bractlets densely pale-tomentose with long soft hairs, concealing the flowers; leaflets 4.5 to 12 cm. wide, covered with stalked stellate hairs----------6. **O. echinops.**
Leaflets petiolulate; bractlets glabrate or puberulent, not concealing the flowers; leaflets mostly 2.5 to 4.5 cm. wide, rarely wider, glabrous, or the pubescence of the upper surface, at least, of sessile stellate hairs.
Leaflets densely stellate-pubescent beneath, the hairs stalked.
7. **O. langlassei.**
Leaflets glabrous beneath, or the pubescence of minute sessile stellate hairs----------8. **O. xalapense.**

1. **Oreopanax platyphyllum** Marchal, Bull. Acad. Brux. II. 47: 88. 1879.
Type from Jocotepec (Oaxaca ?).
Plants glabrous throughout; leaves long-petiolate, suborbicular or rounded-ovate, 10 to 20 cm. wide, with 2 or 3 triangular teeth or entire, thin; panicles 8 to 12 cm. long, the heads 1 cm. in diameter, the pistillate ones 5 to 8-flowered; fruit 7-sulcate.

2. **Oreopanax liebmanni** Marchal, Bull. Acad. Brux. II. 47: 87. 1879.
Veracruz and probably elsewhere; type from "Alpatlahua." Guatemala.
Plants glabrous throughout; leaves long-petiolate, elliptic or elliptic-oblong, 10 to 18 cm. long, 4 to 8 cm. wide, abruptly acuminate, cuneate or obtuse at base, entire, coriaceous; panicles 8 to 20 cm. long; fruit 5-seeded.

3. **Oreopanax capitatum** (Jacq.) Planch. & Decaisne, Rev. Hort. 1854: 108. 1854.
Aralia capitata Jacq. Stirp. Amer. 89. *pl. 61.* 1763.
Veracruz. West Indies; Central and South America.
Shrub, usually epiphytic, sparsely puberulent in the inflorescence, otherwise glabrous; leaves ovate, elliptic, or rounded, 10 to 25 cm. long or larger, acute to rounded at apex and abruptly short-acuminate, obtuse to subcordate at base, coriaceous; panicles 10 to 30 cm. long, the staminate heads about 5 mm. in diameter; fruit 4 to 6 mm. in diameter.

4. **Oreopanax flaccidum,** Marchal, Bull. Acad. Brux. II. 47: 84. 1879.
Veracruz and Puebla, and perhaps elsewhere; type from Huitamalco.
Tree; leaves long-petiolate, ovate or ovate-elliptic, 13 to 30 cm. long, short-acuminate, rounded or obtuse at base, entire, coarsely stellate-pubescent or finally glabrate; panicles large, the heads numerous; fruit about 5 mm. in diameter.

5. **Oreopanax salvinii** Hemsl. Diag. Pl. Mex. 16. 1878.
Oreopanax jaliscanum S. Wats. Proc. Amer. Acad. 25: 151. 1890.
Aralia lobata Sessé & Moc. Fl. Mex. 86. 1894.
Sonora to Oaxaca and Puebla. Guatemala; type from Volcán de Fuego.
Tree, 12 meters high or less; leaves long-petiolate, 15 to 50 cm. wide, deeply cordate at base, deeply 5 or 7-lobate, the lobes broad or narrow, obtuse to acuminate, sinuate-lobate, when young densely stellate-tomentose beneath but in age often glabrous; panicles very large, the heads small, numerous, long-stalked; fruit black, 2-celled, about 6 mm. in diameter. "Mano de león" (Sinaloa).
The leaves vary greatly in shape and pubescence, but there is no apparent reason for recognizing more than a single species.

6. **Oreopanax echinops** (Schlecht. & Cham.) Planch. & Decaisne, Rev. Hort. **1854**: 108. 1854.

Aralia echinops Schlecht. & Cham. Linnaea **5**: 409 1830.

Veracruz and Oaxaca; type from Hacienda de la Laguna, Veracruz.

Shrub or tree, densely and coarsely stellate-pubescent throughout; leaflets 5 (some of the leaves occasionally only lobed), obovate or oblong-obovate, 9 to 26 cm. long, sessile, abruptly cuspidate-acuminate, thin, remotely sinuate-dentate or subentire; heads 1.5 to 2.5 cm. long, on stout peduncles, in long simple racemes, very dense and many-flowered, the bractlets cuspidate-acuminate.

7. **Oreopanax langlassei** Standl., sp. nov.

Type from the Sierra Madre of Michoacán or Guerrero, altitude 1,750 meters (*Langlassé* 796; U. S. Nat. Herb. no. 386193).

Shrub or small tree, 4 to 5 meters high; leaves (only one seen) long-petiolate, the leaflets 7, slender-petiolulate, narrowly lance-oblong, 10 to 14 cm. long, 2.5 to 3 cm. wide, long-acuminate, cuneate at base, entire, finely pubescent above with sessile stellate hairs, coarsely pubescent beneath with stipitate stellate hairs; racemes very long (40 cm. or more) and slender, densely stellate-pubescent, the peduncles slender, about 2.5 cm. long; staminate heads 5 to 6 mm. in diameter, dense, many-flowered.

8. **Oreopanax xalapense** (H. B. K.) Decaisne & Planch. Rev. Hort. **1854**: 108. 1854.

Aralia xalapensis H. B. K. Nov. Gen. & Sp. **5**: 8. 1821.

Monopanax ghiesbreghtii Regel, Gartenflora **18**: 35. *pl. 606*. 1869.

Oreopanax thibautii Hook. f. in Curtis's Bot. Mag. **104**: *pl. 6340*. 1878.

Oreopanax taubertianum Donn. Smith, Bot. Gaz. **19**: 4. 1894.

Oreopanax loesenerianum Harms, Bot. Jahrb. Engler **23**: 127. 1896.

Jalisco to Veracruz and Chiapas; type from Jalapa, Veracruz. Central America.

Shrub or small tree, sometimes epiphytic; leaflets 5 to 9, narrowly oblong to obovate, 8 to 30 cm. long, acute to long-acuminate, entire or serrate toward the apex, when young usually minutely stellate-pubescent beneath but soon glabrate; heads 5 to 15 mm. in diameter, in long racemes; fruit black. "Higuera" (Costa Rica); "brasil" (El Salvador).

The rather ample material available exhibits notable diversity in size and shape of leaflets and size of heads, and it may be that more than a single species is represented. Much more material is necessary, however, before this can be determined, and it seems probable to the writer that all the specimens represent a single variable species. *O. taubertianum* is a form with serrate leaflets, *O. loesenerianum* is noteworthy for the small staminate heads, which are only 5 mm. in diameter.

3. GILIBERTIA Ruiz & Pav. Fl. Peruv. Chil. Prodr. 50. 1794.

Glabrous shrubs or trees; leaves simple, entire or 3-lobate, long-petiolate; umbels paniculate or umbellate, the bracts minute or none; flowers perfect; calyx entire or 5 or 6-denticulate; petals 5 or 6; fruit fleshy, 5 or 6-celled.

Lateral nerves of the leaves ascending at an acute angle.....1. G. arborea.
Lateral nerves divaricate horizontally.....2. G. juergenseni.

1. **Gilibertia arborea** (L.) Marchal, Bull. Soc. Bot. Belg. **30**: 281. 1891.

Aralia arborea L. Syst. Nat. ed. 10. 967. 1759.

Hedera alaris Schlecht. Linnaea **9**: 605. 1834.

Dendropanax arboreum Planch. & Decaisne, Rev. Hort. 1854: 107. 1854.
Dendropanax alare Planch. & Decaisne, Rev. Hort. 1854: 107. 1854.
?*Gilibertia populifolia* Marchal, Bull. Acad. Brux. II. 47: 77. 1879.
?*Dendropanax langeanum* Marchal, Bull. Acad. Brux. II. 47: 79. 1879.
Gilibertia insularis Rose, U. S. Dept. Agr. N. Amer. Fauna 14: 83. 1899.

Tepic to Tamaulipas, Veracruz, and Chiapas. West Indies; Central and South America.

Tree, 8 to 20 meters high, the branches whorled; leaves oblong to broadly ovate, 10 to 20 cm. long, acute or acuminate, rounded to acute at base, entire, those on young shoots often 3 or 5-lobate; umbels few, the pedicels 5 to 10 mm. long; fruit black, about 6 mm. in diameter. "Palo santo" (Tamaulipas); "palo de danta," "mano de danta" (Oaxaca); "mano de león" (Durango, Sinaloa, El Salvador); "cacho de venado" (Costa Rica); "víbona" (Cuba, Porto Rico); "palo cachimba," "bíbona," "ramón de vaca," "ahorca jíbaro" (Cuba); "pana," "palo cachumba," "muñeca" (Porto Rico); "vaquero" (Panama).

The wood is said to be fibrous, rather heavy, yellow, with reddish heartwood. It is little used except for fuel. The leaves are employed in Tamaulipas as a remedy for fever.

The writer has seen no authentic material of Marchal's species, but the descriptions do not suggest any important differences. *Gilibertia populifolia* was made the type of a new subgenus because of its 6-parted (rather than 5-parted) flowers, but the flowers of *G. arborea* appear to be variable in the number of their parts.

Aralia fruticosa, *A. tuxtlensis*, and *A. longifolia* of Sessé and Mociño[1] are probably synonyms of this species.

2. Gilibertia juergenseni (Seem.) Standl.

Dendropanax juergenseni Seem. Journ. Bot. Brit. & For. 2: 301. 1864.

Type from Sierra San Pedro Nolasco, Oaxaca.

Leaves ovate-oblong or oblong, 18 cm. long and 10 cm. wide or smaller, acuminate, entire, attenuate at base; umbels compound.

Known to the writer only from the original description; perhaps only a form of *G. arborea*.

DOUBTFUL SPECIES.

DENDROPANAX CITRIFOLIUM Planch. & Decaisne, Rev. Hort. 1854: 107. 1854. A nomen nudum. Hemsley, under this name, cites a specimen from Oaxaca.

126. CORNACEAE. Dogwood Family.

REFERENCE: Wangerin in Engl. Pflanzenreich IV. 56a, 229. 1910.

Shrubs or small trees; leaves opposite, entire, deciduous or persistent, estipulate; flowers small, perfect or dioecious; calyx 4 or 5-toothed; petals 4 or 5, valvate; stamens 4 or 5; fruit a drupe or berry.

Flowers dioecious, in ament-like racemes ..... 1. **GARRYA.**
Flowers perfect, in heads or cymes ..... 2. **CORNUS.**

1. GARRYA Dougl. in Lindl. Bot. Reg. 20: *pl. 1686.* 1834.

Shrubs or small trees; leaves persistent, opposite, petiolate, entire, coriaceous; flowers small, dioecious, in ament-like racemes, the staminate pedicellate, the pistillate sessile or nearly so; staminate flowers with 4 valvate sepals, without petals, the stamens 4; pistillate flowers without perianth; fruit baccate, 1 or 2-seeded.

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[1] Fl. Mex. 86, 87. 1894.

Garrya fremontii Torr., of Oregon and California, is known as "feverbush," "skunkbush," or "quinine-bush." The bitter leaves contain an alkaloid, garryine, and are used in California as a tonic and antiperiodic.

Inflorescences simple; flowers usually 3 in each bract----------1. G. veatchii.
Inflorescences all or mostly branched; flowers solitary in the bracts.
Plants glabrous throughout----------2. G. glaberrima.
Plants variously pubescent.
Leaves all or mostly less than twice as long as broad, elliptic or ovate-elliptic.
Leaves glabrous beneath or sparsely sericeous----------3. G. wrightii.
Leaves, at least when young, covered beneath with loose curled hairs----------4. G. ovata.
Leaves mostly two and one-half to four times as long as broad, oblong, elliptic-oblong, or lanceolate.
Bracts of the fruiting racemes linear or linear-lanceolate; leaves acute or acuminate.
Leaves glabrous beneath or with sparse appressed hairs.
5. G. salicifolia.
Leaves with short curved hairs beneath----------6. G. longifolia.
Bracts, at least the lower ones, large and resembling the leaves; leaves mostly rounded or obtuse at apex----------7. G. laurifolia.

1. **Garrya veatchii** Kellogg, Proc. Calif. Acad. 5: 40. 1873.
Garrya flavescens palmeri S. Wats.; Brew. & Wats. Bot. Calif. 1: 276. 1880.
Garrya veatchii palmeri Eastw. Bot. Gaz. 36: 458. 1903.
Baja California; type from Cedros Island. Southern California.
Shrub, 1.5 to 2.5 meters high, the young shoots sericeous; leaves ovate-lanceolate or elliptic-ovate, 2.5 to 7.5 cm. long, acute or acuminate, glabrate and lustrous above, tomentulose beneath; fruiting racemes 2.5 to 5 cm. long; fruit 6 to 8 mm. in diameter.

2. **Garrya glaberrima** Wang. in Engl. Pflanzenreich IV. 56a: 12. 1910.
Type from Encarnación, Jalisco.
Glabrous shrub; leaves elliptic or ovate-elliptic, 5 to 6 cm. long, mucronulate, lustrous above; pistillate racemes few-flowered, 4.5 cm. long or less; fruit 7 to 8 mm. in diameter.

3. **Garrya wrightii** Torr. U. S. Rep. Expl. Miss. Pacif. 4: 136. 1856.
Chihuahua and Sonora. Western Texas to southern Arizona; type from Santa Rita, New Mexico.
Shrub, 1 to 3 meters high, the branchlets sericeous; leaves elliptic-oblong to broadly elliptic, 3.5 to 5 cm. long, mucronulate, in age glabrous or nearly so; pistillate racemes 3 to 7 cm. long, the lower bracts foliaceous; fruit dark blue, 4 to 7 mm. in diameter.

4. **Garrya ovata** Benth. Pl. Hartw. 14. 1839.
Garrya goldmanii Woot. & Standl. Contr. U. S. Nat. Herb. 16: 157. 1913.
Chihuahua to San Luis Potosí and Puebla; type from Guanajuato. Western Texas and southern New Mexico.
Shrub, 0.5 to 3 meters high, the branchlets tomentulose; leaves 2.5 to 5 cm. long, obtuse or subacute, when young usually densely tomentulose on both surfaces, in age glabrate and lustrous above; fruit dark blue, 4 to 8 mm. in diameter.
Wangerin gives as a vernacular name "jaraskigo," which must be a corruption of some Mexican word.

5. **Garrya salicifolia** Eastw. Bot. Gaz. 36: 463. 1903.

Mountains of Baja California; type from Sierra de la Laguna.

Shrub, 3.5 to 5.5 meters high, the branchlets sericeous; leaves lanceolate or oblong-lanceolate, 3 to 6 cm. long, soon glabrate; fruit globose, 5 to 6 mm. in diameter.

6. **Garrya longifolia** Rose, Contr. U. S. Nat. Herb. 8: 55. 1903.

Morelos; type from Sierra de Tepoxtlán, altitude 2,500 meters.

Small tree, the branchlets cinereous-pubescent; leaves lanceolate, 6 to 10.5 cm. long, glabrate on the upper surface; fruit about 7 mm. in diameter.

7. **Garrya laurifolia** Hartw.; Benth. Pl. Hartw. 14. 1839.

Garrya macrophylla Hartw.; Benth. Pl. Hartw. 50. 1840.

Garrya oblonga Benth. Pl. Hartw. 51. 1840.

Garrya racemosa Ramírez, Anal. Inst. Méd. Nac. Méx. 1: 298. 1895.

Garrya gracilis Wang. in Engl. Pflanzenreich IV. 56a: 16. 1910.

Chihuahua to Veracruz, Chiapas, and Jalisco; type from Guanajuato. Guatemala.

Shrub or small tree, sometimes 6 meters high, the branchlets cinereous-tomentulose; leaves mostly oblong, lance-oblong, or oblanceolate-oblong, 6 to 15 cm. long, soon glabrate; fruit dark blue, glabrous, 5 to 8 mm. in diameter. "Cuauchichic," "chichicuahuitl," "quauhchichic" (Mexico, Hidalgo, etc.); "cuahuchichi" (Morelos); "zapotillo"; "ovitano"; "guachichi" (Oaxaca, *Reko;* from the Nahuatl *cuauchichic,* "bitter-tree").

The bark is very bitter and is said to contain an active principle, garryine. It is much used in Mexico as a remedy for diarrhoea.

This species is slightly variable, and several varieties are recognized by Wangerin, but none of them appear to be of systematic importance. One collection reported from Chihuahua by Wangerin as *G. ovata lindheimeri* (Torr.) Coult. & Evans is referable to *G. laurifolia.*

2. CORNUS L. Sp. Pl. 117. 1753.

Shrubs or trees; leaves opposite, entire; flowers small, perfect, cymose or capitate, the heads sometimes involucrate; calyx limb turbinate or campanulate, 4-dentate; petals 4, valvate; stamens 4; fruit drupaceous.

Flowers in cymes.

Stone of the fruit compressed; leaves usually with 5 or 6 pairs of nerves. **1. C. stolonifera.**

Stone not compressed, terete; leaves usually with 2 to 4 pairs of nerves. **2. C. excelsa.**

Flowers capitate.

Head surrounded by 4 large petal-like bracts ..... **3. C. urbiniana.**

Head surrounded by small green bracts ..... **4. C. disciflora.**

1. **Cornus stolonifera** Michx. Fl. Bor. Amer. 1: 92. 1803.

Cornus nelsoni Rose, Contr. U. S. Nat. Herb. 5: 54. 1903.

Chihuahua. Widely distributed in the United States and Canada.

Shrub, 1 to 3 meters high, the stems reddish purple, the young branches strigose-sericeous; leaves ovate or elliptic-ovate, 3 to 10 cm. long, acute, pale beneath and sparsely sericeous; cymes 2.5 to 5 cm. wide; petals white, 4 mm. long; fruit white or bluish, 5 to 7 mm. in diameter.

The red-osier dogwood is common along streams in the United States, especially in the West. The branches were often employed by the Indians in making baskets. This is one of the plants to which the name kinnikinnick has been given, the leaves and inner bark having been smoked, either alone or mixed with tobacco, by the Indians.

2. Cornus excelsa H. B. K. Nov. Gen. & Sp. 3: 430. 1818.

Cornus tolucensis H. B. K. Nov. Gen. & Sp. 3: 430. 1818.

Cornus declinata Sessé & Moc. Fl. Mex. 29. 1893.

Cornus lanceolata Rose, Contr. U. S. Nat. Herb. 8: 55. 1903.

Tepic to San Luis Potosí, Veracruz, and Chiapas; type collected between Chalco and the City of Mexico. Guatemala.

Shrub or small tree, 7.5 meters high or less, the branches purplish or brown, puberulent at first; leaves ovate or lance-ovate, 5 to 10 cm. long, long-acuminate, thinly strigillose or pilosulous beneath or glabrate; cymes rather few-flowered; petals white, 3.5 to 4.5 mm. long; fruit pale blue, 5 to 6 mm. in diameter. "Palo de membrillo" (San Luis Potosí); "topoza" (Mexico, Veracruz); "tepeacuilotl," "tepecuilo," "tepecuilote" (Valley of Mexico); "aceitunillo" (Nueva Farmacopea Mexicana); "jazmín cimarrón" (Mexico).

The bark is employed locally as a tonic and astringent. Palmer reports that in San Luis Potosí the tough branches are used for fastening down the roofs of houses.

This species was reported by Sessé and Mociño as *C. alba.*

3. Cornus urbiniana Rose, Contr. U. S. Nat. Herb. 8: 53. 1903.

Cornus florida urbiniana Wang. in Engl. Pflanzenreich IV. 229: 87. 1910.

Veracruz; type from Cerro de San Cristóbal, near Orizaba.

Large shrub or small tree; leaves ovate-elliptic, 7 to 14 cm. long, acuminate, glabrate above, pale beneath and sericeous-strigillose; flower heads pedunculate, the bracts white and petal-like, oblong or narrowly obovate, 5 cm. long or less; fruit red. "Corona de Montezuma," "corona de San Pedro."

This is very closely related to *C. florida* L., the flowering dogwood, one of the handsomest trees of the United States. The Mexican plant differs chiefly in its narrower bracts, and it is doubtful whether it is more than a mere form of *Cornus florida,* under which name it was reported by Hemsley.

Cornus florida, as found in the United States, is a tree, sometimes 15 meters high, with hard, tough, close-grained, red-brown wood, with a specific gravity of about 0.81. The wood is much used for wheel hubs, tool handles, and other articles, and has been used as a source of charcoal for gunpowder. The bark is reputed to be tonic, astringent, and febrifuge, and was formerly employed in the southern states as a substitute for quinine. The berries were used in the same way. From the roots the Indians obtained a scarlet dye. The flowering dogwood is frequently cultivated. The most showy form is *Cornus florida rubra* Rehder, in which the bracts are red or pink.

4. Cornus disciflora DC. Prodr. 4: 273. 1830.

Cornus grandis Schlecht. & Cham. Linnaea 5: 171. 1830.

Cornus capitata Sessé & Moc. Fl. Mex. 28. 1893. Not *C. capitata* Wall. 1820.

Cornus floccosa Wang. Repert. Nov. Sp. Fedde 6: 101. 1908.

Tepic to Zacatecas, Mexico, Morelos, and Oaxaca. Central America.

Shrub or small tree; leaves lanceolate or oblong-elliptic, 6 to 15 cm. long, acute or acuminate, acute at base, pale beneath and sericeous-strigillose or tomentulose; flower heads pedunculate, 12 to 25-flowered; petals whitish, 3 to 3.5 mm. long; fruit ellipsoid, 12 to 14 mm. long, purplish. "Xochilcorona" (Michoacán, Veracruz, Oaxaca).

Cornus floccosa is a form in which the leaves are floccose-villosulous beneath, while in the typical form all the hairs are straight and closely appressed. The extremes appear distinct, but there are intermediate forms, and in some specimens in the National Herbarium both forms of pubescence occur upon separate leaves of the same branch.

127. CLETHRACEAE. Clethra Family.

1. CLETHRA L.

Shrubs or trees; leaves alternate, petiolate, entire or toothed; flowers perfect, in terminal, simple or branched racemes; calyx 5-cleft, the lobes imbricate, persistent; petals 5, white, imbricate, deciduous; stamens 10, the anthers sagittate, opening by apical pores; fruit a 3-lobed, loculicidally 3-valvate capsule.

Leaves glabrous beneath ..... 1. C. suaveolens.
Leaves finely or coarsely tomentose beneath.
  Pedicels shorter than the calyx, very stout.
    Leaves covered beneath with a minute, very close tomentum. 2. C. alcoceri.
    Leaves covered beneath with a coarse loose tomentum ..... 3. C. mexicana.
  Pedicels all or mostly as long as the calyx, comparatively slender.
    Calyx 2.5 to 3 mm. long; leaves with a fine close tomentum beneath.
      Pedicels mostly 7 to 12 mm. long ..... 4. C. pringlei.
      Pedicels mostly 2 to 4 mm. long ..... 5. C. macrophylla.
    Calyx 3 to 5 mm. long; leaves with a coarse loose tomentum beneath.
      Leaves coarsely and sharply serrate ..... 6. C. rosei.
      Leaves entire, undulate-dentate, or serrulate.
        Leaves oblong ..... 7. C. hartwegi.
        Leaves mostly obovate ..... 8. C. lanata.

1. Clethra suaveolens Turcz. Bull. Soc. Nat. Moscou 36²: 230. 1863.

Type from Chiapas, at an altitude of 2,100 meters. Guatemala.

Branches glabrous or nearly so; leaves mostly oblong, 6 to 12 cm. long, acute or acuminate, entire; racemes 10 to 16 cm. long, the slender pedicels 3 to 8 mm. long; calyx tomentose, about 4 mm. long; petals 5 mm. long.

2. Clethra alcoceri Greenm. Proc. Amer. Acad. 41: 240. 1905.

Known only from the type locality, Trinidad Iron Works, Hidalgo, altitude 1,590 meters.

Small tree, the branchlets brown-tomentulose; leaves obovate-oblong or elliptic-lanceolate, 10 to 14 cm. long, acute or short-acuminate, serrate, glabrate above; racemes 10 to 20 cm. long, the pedicels 1 to 3 mm. long; calyx 3 mm. long; petals erose-fimbriate.

3. Clethra mexicana DC. Prodr. 7: 590. 1839.

Clethra obovata Hook. & Arn. Bot. Beechey Voy. 302. 1837. Not *C. obovata* Ruiz & Pav. 1834.

Clethra quercifolia Lindl. Bot. Reg. 28: *pl. 23*. 1842.

?*Kowalewskia serrulata* Turcz. Bull. Soc. Nat. Moscou 32¹: 264. 1859.

?*Clethra serrulata* Turcz. Bull. Soc. Nat. Moscou 36²: 233. 1863.

Clethra palmeri Britton, N. Amer. Fl. 29: 8. 1914.

Clethra schlechtendalii Briq. Ann. Cons. Jard. Genève 20: 370. 1919.

Durango to Veracruz, Morelos, Guerrero, and Michoacán.

Shrub or small tree, 9 meters high or less, the branchlets brownish-tomentose; leaves obovate to oval, 6 to 20 cm. long, 4 to 10 cm. wide, acute or obtuse, serrate or entire, densely tomentose beneath; racemes dense, 10 to 20 cm. long; pedicels 1.5 to 4 mm. long; calyx 3.5 to 4.5 mm. long. "Jaboncillo" (Durango).

The flowers, as in other species, are very fragrant.

4. Clethra pringlei S. Wats. Proc. Amer. Acad. **25**: 157. 1890.

San Luis Potosí; type from Tamasopo Canyon.

Tree, 9 to 15 meters high, the trunk 30 to 45 cm. in diameter; leaves obovate or oblong, 4 to 11 cm. long, acute or acuminate, entire, glabrous above; racemes lax, 10 to 25 cm. long; petals short-fimbriate; capsule tomentulose, 3 to 4 mm. broad.

5. Clethra macrophylla Mart. & Gal. Bull. Acad. Brux. 9^1: 539. 1842.

Veracruz; type material collected near Totutla and Mirador.

Small tree, the branchlets closely brownish-tomentulose; leaves obovate or oblong-elliptic, 12 to 20 cm. long, acute or subacuminate, green and glabrate above; racemes 10 to 15 cm. long, lax; pedicels 2 to 4 mm. long.

6. Clethra rosei Britton, N. Amer. Fl. **29**: 6. 1914.

Known only from the type locality, near Colomas, Sinaloa.

Branchlets brown-tomentose; leaves oblong, 6 to 11 cm. long, acute or obtuse, pubescent above, densely tomentose beneath; racemes 10 to 12 cm. long, the pedicels 3 to 5 mm. long; capsule 3 mm. broad.

7. Clethra hartwegi Britton, N. Amer. Fl. **29**: 6. 1914.

Known only from the type locality, Bolaños, Jalisco.

Branchlets tomentose; leaves 10 to 12 cm. long, obtuse or acutish, entire or undulate, dentate, pubescent above or glabrate, tomentose beneath; racemes 8 to 12 cm. long.

8. Clethra lanata Mart. & Gal. Bull. Acad. Brux. 9^1: 538. 1842.

Kowalewskia integerrima Turcz. Bull. Soc. Nat. Moscou 32^1: 264. 1859.

Clethra kowalewskii Turcz. Bull. Soc. Nat. Moscou 36^2: 233. 1863.

Clethra galeottiana Briq. Ann. Cons. Jard. Genève **20**: 371. 1919.

Clethra confusa Briq. Ann. Cons. Jard. Genève **20**: 372. 1919.

Clethra guadalajarensis Briq. Ann. Cons. Jard. Genève **20**: 373. 1919.

Sinaloa and Jalisco to Veracruz and Oaxaca; type from Oaxaca. Central America.

Tree, 6 to 12 meters high, the branchlets brown-tomentose; leaves 6 to 15 cm. long, rounded to subacute at apex, usually cuneate at base, thick, entire or sparsely dentate, glabrate above; racemes 8 to 20 cm. long, dense; capsule 4 mm. broad. "Mameyito negro" (Oaxaca, *Reko*); "mama malhuaztili" (*Altamirano & Ramírez*); "nance" (Costa Rica); "tepezapote," "terciopelo," "zapotillo de montaña" (El Salvador).

128. PYROLACEAE. Pyrola Family.

Reference: Rydb. N. Amer. Fl. **29**: 21–32. 1914.

Several species of *Pyrola* occur in Mexico.

1. CHIMAPHILA Pursh, Fl. Amer. Sept. 279. 1814.

Plants low, suffrutescent, with creeping rootstocks; leaves opposite or subverticillate, leathery, persistent, serrate; flowers perfect, in few-flowered terminal umbels or racemes; sepals 5; petals 5; stamens 10, the anthers opening by terminal tubes; style nearly obsolete, the stigma peltate, 5-radiate; fruit a 5-celled capsule.

Dilated portion of the filament glabrous or ciliolate; leaves mostly oblanceolate, green, not mottled ..... 1. C. umbellata.

Dilated portion of the filament villous; leaves lanceolate or ovate, mottled with light and dark green ..... 2. C. maculata.

1. Chimaphila umbellata (L.) Barton, Veg. Nat. Med. 1: 17. 1817.

Pyrola umbellata L. Sp. Pl. 396. 1753.

Chimaphila umbellata mexicana DC. Prodr. 7: 775. 1839.

Chimaphila mexicana Rydb. N. Amer. Fl. 29: 31. 1914.

In mountain forests, Veracruz, Mexico, Oaxaca, and Chiapas. Widely distributed in the United States, Canada, and Europe.

Plants 10 to 40 cm. high, the stems simple or branched; leaves in whorls of 4 to 7, 3 to 10 cm. long, acute or obtuse, sharply serrate, short-petiolate, glabrous; flowers long-pedicellate; sepals broadly ovate; petals pink, 7 mm. long, oval; capsule 6 to 10 mm. in diameter.

The Mexican form is *C. umbellata mexicana* DC., but it differs only slightly from the European plant, and scarcely seems worthy of special designation.

2. Chimaphila maculata (L.) Pursh, Fl. Amer. Sept. 300. 1814.

Pyrola maculata L. Sp. Pl. 396. 1753.

Chimaphila maculata acuminata Lange, Nat. For. Kjöbenhavn Vid. Medd. 1867: 112. 1868.

Chimaphila acuminata Rydb. N. Amer. Fl. 29: 31. 1914.

Chimaphila guatemalensis Rydb. N. Amer. Fl. 29: 32. 1914.

Chimaphila dasystemma Torr.; Rydb. N. Amer. Fl. 29: 32. 1914.

In mountain forests, Chihuahua and Sonora to Veracruz and Oaxaca. Central America; eastern United States.

Stems 10 to 20 cm. high; leaves in few whorls, oblong-lanceolate to broadly ovate, 2 to 7 cm. long, acute or acuminate, glabrous; inflorescence 1 to 4-flowered, the flowers long-pedicellate; sepals rounded-ovate, ciliolate; petals oval or orbicular, 6 to 8 mm. long, white or pink; capsule 6 to 8 mm. in diameter.

The Mexican material varies appreciably in leaf shape, but the forms do not appear to differ constantly from typical *C. maculata*.

129. ERICACEAE. Heath Family.

REFERENCE: Small, N. Amer. Fl. 29: 33–102. 1914.

Shrubs or trees; leaves alternate or rarely opposite, estipulate, persistent, leathery, entire or serrate; flowers perfect, usually in racemes or panicles; calyx of 4 to 7 distinct or partially united sepals; corolla of 4 to 7 distinct or united petals; stamens as many or twice as many as the corolla lobes, the anthers 2-celled, often appendaged; style compound, the stigma minute, discoid; fruit a capsule, drupe, or berry.

Corolla of distinct petals. Fruit a capsule.....1. **BEFARIA.**

Corolla of united petals.

Fruit a capsule, the calyx dry, not accrescent.

Calyx lobes imbricate in bud; pubescence not lepidote...2. **LEUCOTHOE.**

Calyx lobes valvate or separated in bud; pubescence of scales.

3. **XOLISMA.**

Fruit baccate or drupaceous, or capsular but surrounded by the fleshy accrescent calyx.

Fruit capsular, surrounded by the fleshy accrescent calyx.

4. **GAULTHERIA.**

Fruit baccate or drupaceous.

Fruit drupaceous; cells of the ovary 1-ovulate.

5. **ARCTOSTAPHYLOS.**

Fruit baccate; cells of the ovary few or many-ovulate.

Fruit papillose; large shrubs or trees.....6. **ARBUTUS.**

Fruit smooth; low shrubs.....7. **PERNETTIA.**

1. BEFARIA Mutis; L. Mant. Pl. 152. 1771.

Shrubs; leaves alternate, short-petiolate, persistent, entire; flowers in terminal panicles; calyx campanulate, 6 or 7-lobate; petals 6 or 7, ascending or spreading, narrow; stamens 12 or 14, the anthers opening by apical pores; capsule depressed, shallowly 6 or 7-lobate, septicidal.

Branches of the inflorescence glabrous or nearly so----------1. **B. laevis.**
Branches of the inflorescence densely viscid-pilose.
Petals 1.5 to 2 cm. long----------2. **B. discolor.**
Petals 2.5 to 4 cm. long----------3. **B. mexicana.**

1. **Befaria laevis** Benth. Pl. Hartw. 65. 1840.
Befaria glabra Mart. & Gal. Bull. Acad. Brux. **9**[1]: 543. 1842.
Puebla and Oaxaca; type from Talea, Oaxaca.
Branches glabrous or nearly so; leaves oblong-lanceolate or linear-lanceolate, 3 to 8 cm. long, acuminate, glabrous, bright green above, glaucous beneath; flowers long-pedicellate; petals pink, 12 to 20 mm. long. "Cruz de Mayo" (Puebla).

2. **Befaria discolor** Benth. Pl. Hartw. 65. 1840.
Befaria floribunda Mart. & Gal. Bull. Acad. Brux. **9**[1]: 543. 1842.
Jurgensia mexicana Turcz. Bull. Soc. Nat. Moscou **20**[1]: 151. 1847.
Guerrero and Oaxaca; type from Talea, Oaxaca.
Branches viscid-hispid; leaves ovate or oblong-elliptic, 3 to 6.5 cm. long, obtuse or acute, glabrous above, glaucous beneath and pubescent or glabrate; petals spatulate, pink.

3. **Befaria mexicana** Benth. Pl. Hartw. 15. 1839.
Zacatecas to Sinaloa and Oaxaca; type from Zacatecas.
Branches hispid; leaves oblong to oblong-elliptic, 2 to 5.5 cm. long, obtuse or acute, glabrous above, glaucous beneath and pubescent, at least along the costa. "Rosa del monte" (Oaxaca).

2. LEUCOTHOE D. Don, Edinb. New Phil. Journ. **17**: 159. 1834.

1. **Leucothoe mexicana** (Hemsl.) Small, N. Amer. Fl. **29**: 57. 1914.
Andromeda mexicana Hemsl. Biol. Centr. Amer. Bot. **2**: 282. 1881.
Oaxaca; type from Sierra San Pedro Nolasco. Guatemala.
Shrub; leaves alternate, petiolate, persistent, lanceolate or oblong-lanceolate to ovate, 2.5 to 7 cm. long, long-acuminate, rounded at base, entire, glabrous; flowers in small axillary corymb-like panicles, the branches puberulent; calyx 4 mm. broad, the 5 lobes broadly ovate; corolla cylindric-urceolate, 8 to 12 mm. long, white, minutely 5-dentate; stamens 10; fruit a 5-lobed septicidal capsule.

3. XOLISMA Raf. Amer. Month. Mag. **4**: 193. 1819.

1. **Xolisma squamulosa** (Mart. & Gal.) Small, N. Amer. Fl. **29**: 66. 1914.
Lyonia squamulosa Mart. & Gal. Bull. Acad. Brux. **9**[1]: 542. 1842.
San Luis Potosí, Veracruz, Puebla, and Oaxaca; type from Cofre de Perote, Veracruz.
Shrub, 2 meters high or less; leaves alternate, petiolate, persistent, elliptic, oval, or obovate-elliptic, 2 to 4 cm. long, rounded to acute at apex, leathery, entire, lepidote beneath; flowers in small dense axillary clusters; calyx lobes ovate, acute; corolla white, urceolate, 3 to 4 mm. long, lepidote; capsule 3.5 to 4 mm. long, subglobose, septicidal.

This is very closely related to *X. ferruginea* (Walt.) Heller (*Andromeda ferruginea* Walt.), of the southern United States, and has been referred to that species by Hemsley and others. The Mexican plant differs only in its slightly shorter capsules and it is doubtful whether it represents a distinct species.

4. GAULTHERIA L. Sp. Pl. 395. 1753.

Shrubs; leaves alternate, persistent, usually toothed; flowers racemose or paniculate; calyx persistent, the lobes longer than the tube; corolla campanulate or urceolate, with 5 spreading or recurved lobes; stamens 10, the anthers 2-awned, opening by terminal pores; fruit berry-like, fleshy, the capsule inclosed in the accrescent calyx.

Gaultheria procumbens L., of the United States and Canada, is the wintergreen or checkerberry, from which wintergreen oil is obtained. The fruits of some of the species are edible.

The names "ajocopaque," "axocopaque," and "axocaponi" are applied in southern Mexico to various species. The leaves are aromatic, and Hernández relates that they were used for flavoring chocolate and other beverages, and that they were laid among clothing to impart an agreeable odor and to keep away insects. The branches are even now employed as perfume in churches. The plants are said to have diuretic and laxative properties, and are used in domestic medicine.

Rachis of the inflorescence glabrous or finely pubescent, never hirsute or with gland-tipped hairs; rachis rarely with a few gland-tipped hairs, the corolla then glabrous.
Calyx lobes acute, about as wide as long ..... 1. G. acuminata.
Calyx lobes acuminate, much longer than wide.
Branches of the inflorescence pubescent ..... 2. G. nitida.
Branches of the inflorescence glabrous.
Leaves green, serrulate ..... 3. G. nelsonii.
Leaves glaucous, entire ..... 4. G. glaucifolia.
Rachis of the inflorescence glandular-pilose or hirsute; corolla never glabrous.
Pubescence of the corolla of eglandular hairs.
Leaves narrowly oblong-lanceolate ..... 5. G. angustifolia.
Leaves ovate-oblong or ovate ..... 6. G. parvifolia.
Pubescence of the corolla of gland-tipped hairs.
Filaments equaling or shorter than the anthers ..... 7. G. trichocalycina.
Filaments longer than the anthers.
Leaf blades truncate to obtuse at base ..... 8. G. hidalgensis.
Leaf blades evidently cordate at base.
Pedicels twice as long as the corollas or longer ..... 9. G. longipes.
Pedicels little if at all longer than the corollas.
Leaves ovate or ovate-oblong; branches sparsely short-hirsute or puberulent ..... 10. G. odorata.
Leaves mostly deltoid-ovate; branches densely hirsute. 11. G. hirtiflora.

1. Gaultheria acuminata Schlecht. & Cham. Linnaea 5: 126. 1830.

Veracruz and Puebla; type from Cerro Colorado, near Jalapa, Veracruz.

Shrub, 1 to 2.5 meters high, the branches glabrous or puberulent; leaves oblong to ovate, 4 to 11 cm. long, acuminate, rounded at base, serrulate; racemes 4 to 10 cm. long, finely pubescent; corolla 7 to 8 mm. long. "Axocopaconi" (Puebla), "arrayán" (*Conzatti*).

2. **Gaultheria nitida** Benth. Pl. Hartw. 45. 1840.
Gaultheria laevigata Mart. & Gal. Bull. Acad. Brux. 9[1]: 541. 1842.
Veracruz, Puebla, Hidalgo, and Oaxaca; type from El Banco, Hidalgo.
Shrub or small tree, the branchlets glabrous or nearly so; leaves oblong to oblong-ovate, 3 to 11 cm. long, acute or acuminate, rounded at base, serrulate, glabrate; racemes 4 to 8 cm. long; corolla pink, 7 to 8 mm. long.

3. **Gaultheria nelsonii** Small, N. Amer. Fl. **29**: 77. 1914.
Known only from the type locality, Totontepec, Oaxaca.
Leaves oblong, 5 to 11 cm. long, short-acuminate, subcordate at base, serrulate, glabrous; racemes 5 to 8 cm. long; corolla pink, 4.5 to 5.5 mm. long.
Probably only a form of *G. nitida*.

4. **Gaultheria glaucifolia** Hemsl. Biol. Centr. Amer. Bot. **2**: 281. 1881.
Type from the Sierra Madre of western Mexico.
Branchlets glabrous; leaves ovate or oblong-ovate, 2.5 to 5 cm. long, acute, glabrous, rounded or subcordate at base; racemes few-flowered.

5. **Gaultheria angustifolia** T. S. Brandeg. Zoe **5**: 251. 1908.
Type from Mount Ixtaccihuatl.
Branches pubescent; leaves 2 to 5 cm. long, 8 to 14 mm. wide, long-acuminate, serrulate, glabrous; racemes 2 to 4 cm. long; corolla 6 to 7 mm. long.

6. **Gaultheria parvifolia** Small, N. Amer. Fl. **29**: 78. 1914.
Puebla and Oaxaca; type from mountains of Oaxaca.
Branches hirsute or glabrate; leaves oblong to oval-ovate, 2 to 6 cm. long, acute or obtuse, rounded or subcordate at base, serrulate, glabrate; racemes 2 to 6 cm. long; corolla pink, 6 to 7 mm. long.

7. **Gaultheria trichocalycina** DC. Prodr. **7**: 595. 1839.
Type collected between Pueblo Viejo, Veracruz, and Real del Monte, Hidalgo; reported from Jalisco.
Branchlets glandular-pubescent; leaves ovate, 1 to 3 cm. long, acute, deeply cordate at base, serrulate; racemes 4 to 8 cm. long; corolla 6 to 7 mm. long.

8. **Gaultheria hidalgensis** Loesener, Bull. Herb. Boiss. **2**: 552. 1894.
Gaultheria lancifolia Small, N. Amer. Fl. **29**: 78. 1914.
Gaultheria rosei Small, N. Amer. Fl. **29**: 79. 1914.
Tepic to Morelos and Chiapas; type from Othamalacatle, Hidalgo; specimens from Chihuahua probably are conspecific. Guatemala.
Small or large shrub, the branchlets pubescent, hirsute, or glabrate; leaves oblong to ovate or oval, 3 to 9 cm. long, acute or acuminate, serrulate, glabrous or nearly so; racemes 4 to 8 cm. long; corolla pink, 5 to 7.5 mm. long; fruit 4 to 6 mm. in diameter. "Arrayán" (*Seler*).

9. **Gaultheria longipes** Small, N. Amer. Fl. **29**: 76. 1914.
Type from Sierra de Tepoxtlán, Morelos, altitude 2,250 meters.
Slender shrub, the branchlets hirsute or glabrate; leaves oblong or ovate, 2 to 6 cm. long, acute, serrulate, glabrate; racemes 4 to 6 cm. long; pedicels 1 to 2 cm. long; corolla pink, 6.5 to 7.5 mm. long; capsule 3 to 4 mm. in diameter.

10. **Gaultheria odorata** Willd. Ges. Naturf. Freund. Berlin Mag. Neu. Schrift. **3**: 425. 1801.
Gaultheria odorata mexicana DC. Prodr. **7**: 595. 1839.
Gaultheria hartwegiana Loesener, Bull. Herb. Boiss. II. **3**: 217. 1903.
Puebla and Oaxaca; imperfect specimens from Chihuahua may belong here. Central America and northern South America; type from Caracas, Venezuela.

Shrub; leaves 2 to 8 cm. long, acuminate, serrulate, sparsely pubescent or glabrate, short-petiolate; racemes 3 to 9 cm. long, lax; corolla pink, 6 to 7 mm. long; capsule about 5 mm. in diameter.

11. Gaultheria hirtiflora Benth. Pl. Hartw. 66. 1840.

Gaultheria cordata Mart. & Gal. Bull. Acad. Brux. 9[1]: 540. 1842.

Puebla, Oaxaca, and Chiapas; type from Carmen, Oaxaca. Guatemala.

Leaves 3 to 9 cm. long, acute or obtuse, often deeply cordate at base, serrulate, pubescent or glabrate; racemes 3 to 6 cm. long; corolla pink or red, 6 to 7 mm. long; capsule 4 to 5 mm. in diameter.

This is not strikingly different from *G. odorata*, and is perhaps only a form of that species.

DOUBTFUL SPECIES.

GAULTHERIA OVATA DC. Prodr. 7: 596. 1839. Type collected between Tampico and Real del Monte. Probably the same as *G. nitida* Benth.

GAULTHERIA INSIPIDA Benth., placed by Small among the doubtful North American species, was described from Ecuador.

5. ARCTOSTAPHYLOS Adans. Fam. Pl. 2: 165. 1763.

Shrubs or small trees; leaves alternate, rarely opposite, persistent, petiolate, entire or serrate; flowers in terminal racemes or panicles, small, white or pink; calyx 5-lobed; corolla urceolate, with 5 short lobes; stamens 10, the anthers each with 2 dorsal awns; fruit drupaceous, globose, smooth or papillose, containing 10 or fewer seedlike nutlets.

The following names are reported for species whose identity is uncertain: "Guie-yana," "yaga-nita," "yaga-yana" (Oaxaca, Zapotec, *Reko*); "niño en cuero," "verdis" (Oaxaca, *Reko*); "tepetomate" (*Robelo*); "frutilla" (Mexico, *Ramírez*).

Leaves opposite or verticillate----1. **A. oppositifolia.**
Leaves alternate.
  Leaves conspicuously serrate.
    Leaves glabrous, even when young.
      Leaves green beneath; fruit 4 to 5 mm. in diameter----2. **A. lucida.**
      Leaves glaucous beneath; fruit 7 to 8 mm. in diameter----3. **A. arguta.**
    Leaves tomentose beneath, at least when young.
      Ovary pubescent.
        Calyx glandular-pubescent----4. **A. nochistlanensis.**
        Calyx grayish-tomentulose----5. **A. diversifolia.**
      Ovary glabrous.
        Leaves broadly oblong to obovate or elliptic, 2 to 5 cm. long.
          6. **A. conzattii.**
        Leaves narrowly oblong, usually larger.
          Leaves remotely and inconspicuously serrate----7. **A. angustifolia.**
          Leaves closely and conspicuously serrate.
            Inflorescence glandular-hirsute----8. **A. longifolia.**
            Inflorescence tomentulose----9. **A. rupestris.**
  Leaves entire.
    Fruit papillose or warty; leaves narrow, mostly oblong to linear, narrow at base.
      Filaments glabrous----10. **A. glaucescens.**

Filaments pubescent.
Ovary glabrous----------11. **A. minor.**
Ovary pubescent.
Leaves densely whitish-tomentose beneath; filaments sparsely pubescent----------12. **A. lanata.**
Leaves thinly tomentose or glabrate beneath; filaments densely pubescent.
Leaves mostly oblong-elliptic, less than 3 times as long as broad. **13. A. caeciliana.**
Leaves linear to narrowly oblong, more than 3 times as long as broad----------14. **A. polifolia.**
Fruit smooth; leaves broad, usually ovate to oval, obtuse or rounded at base.
Leaves whitish-tomentulose beneath, the margins revolute. **15. A. bicolor.**
Leaves not tomentulose beneath, the margins not revolute.
Branchlets glabrous----------16. **A. glauca.**
Branchlets pubescent.
Branchlets glandular-pilose----------17. **A. drupacea.**
Branchlets without glandular hairs.
Pedicels and ovary pubescent----------18. **A. tomentosa.**
Pedicels and ovary glabrous----------19. **A. pungens.**

1. **Arctostaphylos oppositifolia** Parry, Proc. Davenport Acad. 4: 36. 1884.
Ornithostaphylos oppositifolia Small, N. Amer. Fl. 29: 101. 1914.
Mountains of northern Baja California.
Shrub, 4.5 meters high or less; leaves linear, 3 to 8 cm. long, obtuse or acute, entire, the margins revolute, glabrous above, minutely whitish-pubescent beneath; corolla 3 to 3.5 mm. long; fruit 4 to 6 mm. in diameter, smooth.

2. **Arctostaphylos lucida** (Small) Standl.
Comarostaphylis lucida Small, N. Amer. Fl. 29: 89. 1914.
Veracruz and Oaxaca; type from Orizaba.
Branches glabrous; leaves oblong to narrowly elliptic, 3 to 7 cm. long, acute, green, short-petiolate; inflorescence closely pubescent.

3. **Arctostaphylos arguta** (Zucc.) DC. Prodr. 7: 585. 1839.
Comarostaphylis arguta Zucc. Abh. Akad. München 2: 332. 1837.
Arbutus discolor Hook. Icon. Pl. *pl. 29.* 1837.
Arctostaphylos discolor DC. Prodr. 7: 585. 1839.
Arctostaphylos nitida Benth. Pl. Hartw. 66. 1840.
Arctostaphylos spinulosa Mart. & Gal. Bull. Acad. Brux. 9[1]: 537. 1842.
Jalisco to Mexico and Oaxaca.
Shrub, 1.5 to 3 meters high, the branches glabrous; leaves narrowly oblong or oblong-lanceolate, 6 to 15 cm. long, acute, sharply serrulate, bright green above; inflorescence finely pubescent or glabrate; corolla 7 to 8 mm. long, white; fruit granular, dark red. "Garambullo" (Hidalgo, Mexico); "madroño borracho" (Mexico).
The fruit of this plant, or a decoction of the leaves, has narcotic properties. Children have been severely poisoned by eating the fruit, and the plant has been administered by Mexican physicians for the purpose of inducing sleep. The fruit is more active when fresh, and it also has mild purgative properties. The leaves are said to be astringent.

4. **Arctostaphylos nochistlanensis** Loesener, Bull. Herb. Boiss. II. 3: 220. 1903.

Oaxaca; type collected near Tillantongo, Nochistlán.

Branches finely pubescent; leaves oblong or lanceolate, 3 to 5.5 cm. long, obtuse, glabrous above, pale and minutely pubescent beneath; corolla 6 mm. long; fruit 4 to 5 mm. in diameter.

5. **Arctostaphylos diversifolia** Parry; A. Gray, Syn. Fl. ed. 2. 2[1]: 397. 1886.
Arctostaphylos arguta diversifolia Parry, Proc. Davenport Acad. 4: 35. 1884.
Comarostaphylis diversifolia Greene, Bull. Calif. Acad. 2: 406. 1887.

Northern Baja California. Southern California; type from Jamul Valley.

Shrub, the branchlets tomentulose; leaves elliptic or oval, 2 to 9 cm. long, obtuse or acutish, revolute, glabrous above; corolla 5 to 7 mm. long; fruit 4 mm. in diameter.

6. **Arctostaphylos conzattii** Fernald, Proc. Amer. Acad. 36: 497. 1901.
Arctostaphylos glabrata Fernald, Proc. Amer. Acad. 36: 497. 1901.
Comarostaphylis glabrata Small, N. Amer. Fl. 29: 90. 1914.
Comarostaphylis conzattii Small, N. Amer. Fl. 29: 91. 1914.

Puebla, Oaxaca, and Chiapas; type from Cerro de San Felipe, Oaxaca.

Spreading shrub, 0.3 to 1 meter high, the branchlets puberulent; leaves obtuse or acute, glabrous above, thinly tomentose or glabrate beneath, short-petiolate; corolla 4 to 6 mm. long; fruit 6 to 7 mm. in diameter.

7. **Arctostaphylos angustifolia** (Klotzsch) Hemsl. Biol. Centr. Amer. Bot. 2: 278. 1881.
Comarostaphylis angustifolia Klotzsch, Linnaea 24: 74. 1851.

Described from Mexico; specimens from Michoacán probably belong here.

Branchlets finely pubescent; leaves short-petiolate, linear-oblong or narrowly oblong, 3 to 8 cm. long, obtuse or acute, glabrous above, tomentulose beneath; corolla 6 to 7 mm. long; fruit 4 to 6 mm. in diameter.

8. **Arctostaphylos longifolia** Benth. Pl. Hartw. 44. 1840.
Comarostaphylis longifolia Klotzsch, Linnaea 24: 75. 1851.
Comarostaphylis attenuata Klotzsch, Linnaea 24: 75. 1851.
Arctostaphylos attenuata Hemsl. Biol. Centr. Amer. Bot. 2: 278. 1881.

Michoacán and Mexico; type from Angangueo, Michoacán.

Branchlets glandular-hirsute; leaves oblong or narrowly oblong, 5 to 9.5 cm. long, acute or obtuse, glabrate above, tomentose or glabrate beneath; panicles large and dense; corolla 6 to 7 mm. long.

9. **Arctostaphylos rupestris** Robins. & Seat. Proc. Amer. Acad. 28: 112. 1893.
Comarostaphylis rupestris Small, N. Amer. Fl. 29: 90. 1914.

Michoacán and Mexico; type from Pátzcuaro, Michoacán.

Shrub, 1.5 to 4.5 meters high, the branches tomentulose; leaves narrowly oblong, 7 to 16 cm. long, acute, green and glabrate above, pale-tomentulose beneath; panicles lax, equaling or shorter than the leaves; corolla 6 to 7 mm. long.

10. **Arctostaphylos glaucescens** H. B. K. Nov. Gen. & Sp. 3: 278. 1819.
Comarostaphylis glaucescens Zucc.; Klotzsch, Linnaea 24: 76 1851.

Type collected between Guanajuato and Valenciana.

Branchlets puberulent; leaves oblong-lanceolate, 10 cm. long or less, mucronate, glabrous and lustrous above, pubescent and glaucous beneath.

11. **Arctostaphylos minor** (Small) Standl.

Comarostaphylis minor Small, N. Amer. Fl. **29**: 89. 1914.

Type collected near Miquihuana, Tamaulipas.

Branchlets glabrous or nearly so; leaves linear-oblong, 1.5 to 3 cm. long, obtuse, glabrous above, paler and minutely puberulent beneath; corolla 4 to 5 mm. long; fruit 3 to 4 mm. in diameter.

12. **Arctostaphylos lanata** (Small) Standl.

Comarostaphylis lanata Small, N. Amer. Fl. **29**: 88. 1914.

San Luis Potosí; type from Buena Vista.

Branchlets glandular-hirsutulous, densely leafy; leaves oblong or elliptic-oblong, 4 to 6.5 cm. long, acute or mucronate, the margins strongly revolute, hirtellous above; corolla 6 mm. long; fruit 4 to 5 mm. in diameter.

13. **Arctostaphylos caeciliana** Loesener, Bull. Herb. Boiss. **2**: 553. 1894.

Comarostaphylis caeciliana Small, N. Amer. Fl. **29**: 88. 1914.

Oaxaca; type from Huitzo.

Branchlets tomentulose; leaves 3 to 6 cm. long, obtuse or acute, the margins subrevolute, green and glabrate above, densely tomentulose beneath; corolla 5 mm. long; fruit 4 to 5 mm. in diameter.

14. **Arctostaphylos polifolia** H. B. K. Nov. Gen. & Sp. **3**: 277. 1819.

Arctostaphylos oaxacana DC. Prodr. **7**: 585. 1839.

Arctostaphylos mucronifera DC. Prodr. **7**: 585. 1839.

Arctostaphylos ledifolia Mart. & Gal. Bull. Acad. Brux. **9**[1]: 536. 1842.

Arctostaphylos latifolia Mart. & Gal.; Walp. Repert. Bot. **2**: 726. 1843.

Comarostaphylis mucronifera Klotzsch, Linnaea **24**: 76. 1851.

Comarostaphylis mucronata Klotzsch, Linnaea **24**: 76. 1851.

Comarostaphylis polifolia Klotzsch, Linnaea **24**: 77. 1851.

Comarostaphylis hartwegiana Klotzsch, Linnaea **24**: 77. 1851.

Arctostaphylos hartwegiana Hemsl. Biol. Centr. Amer. Bot. **2**: 278. 1881.

Arctostaphylos mucronata Hemsl. Biol. Centr. Amer. Bot. **2**: 279. 1881.

Comarostaphylis microcarpa Small, N. Amer. Fl. **29**: 88. 1914.

Sinaloa to San Luis Potosí, Tlaxcala, and Oaxaca; type from Villapando.

Shrub or tree, 1 to 6 meters high, the branchlets puberulent or glandular-hirtellous; leaves linear to narrowly oblong, 3 to 7 cm. long, obtuse or acute, glabrous above, tomentulose or glabrate beneath, the margins often revolute; corolla 7 to 9 mm. long; fruit 3 to 6 mm. in diameter. "Madroño" (Oaxaca, Sinaloa); "madroño chino" (Sinaloa); "pingüeca," "pingüica" (Morelos, Oaxaca); "tnu-tqué" (Oaxaca, *Seler*).

The species is somewhat variable and several segregates were recognized by Small. The key characters which he used to distinguish them are, however, utterly worthless.

15. **Arctostaphylos bicolor** (Nutt.) A. Gray, Proc. Amer. Acad. **7**: 366. 1868.

Xylococcus bicolor Nutt. Trans. Amer. Phil. Soc. II. **8**: 259. 1843.

Arctostaphylos veatchii Kellogg, Proc. Calif. Acad. **2**: 19. 1863.

Northern Baja California; Cedros Island. Southern California.

Shrub with grayish branches; leaves ovate to oval, 2 to 6 cm. long, obtuse, green and glabrate above; corolla white or pink, 8 to 9 mm. long; fruit 6 to 8 mm. in diameter.

16. **Arctostaphylos glauca** Lindl. Bot. Reg. **21**: *pl. 1791.* 1836.

Mountains of Baja California. California.

Shrub or small tree, sometimes 7.5 meters high, with a trunk 30 cm. in diameter, glabrous throughout; leaves oval, rounded, or broadly ovate, 2 to 5 cm. long, rounded at apex and base, pale green, very thick; corolla white,

7 mm. long; fruit 1 to 1.8 cm. in diameter, dull red. "Manzanita" (California).

The fruit was much eaten by the California Indians, either raw or dried, ground, and made into atole. The leaves were often mixed with smoking tobacco. The leaves contain arbutin and about 9.8 per cent of tannin. A decoction of them has been employed for catarrhal affections, diarrhea, and gonorrhoea.

17. Arctostaphylos drupacea (Parry) Standl.

Arctostaphylos pringlei drupacea Parry, Bull. Calif. Acad. 2: 495. 1887.

Mountains of Baja California. Southern California; type from Cuyamaca Mountains.

Shrub, 1.5 to 2 meters high, with smooth red-brown bark; leaves broadly ovate to oblong, 2.5 to 4.5 cm. long, acute to rounded at base, glandular-pilose; corolla 7 to 8 mm. long; fruit glandular-pubescent.

This has been reported from Baja California as *A. pringlei* Parry, a species of Arizona.

18. Arctostaphylos tomentosa Pursh, Fl. Amer. Sept. 282. 1814.

Northern Baja California. California to British Columbia.

Shrub or small tree, sometimes 6 meters high, with a trunk 20 cm. in diameter; bark smooth, red-brown; leaves broadly ovate to oblong-lanceolate, 3 to 6 cm. long, acute or obtuse, pubescent or glabrate; corolla white or pink, 6 to 7 mm. long; fruit 6 to 8 mm. in diameter, brown, glabrous or pubescent; wood hard, tough, close-grained, reddish or dark brown, heavy, taking a fine polish. "Manzanita" (California).

The wood has been employed in the United States for fine cabinet work. This and other related species are known upon the Pacific Coast as "manzanita." The fruit is edible, having an agreeable acid flavor, but it is dry, mealy, and full of seeds. It was an important article of food among the California Indians, being eaten fresh, or dried and ground and stirred into water to form pinole, or cooked as a mush. Death from intestinal stoppage is said to have resulted from eating too much of the raw fruit. Manzanita cider is sometimes made by scalding the ripe fruit until the seeds are soft, then crushing it and straining the resultant liquid, which is allowed to stand and settle. The beverage so obtained is spicy and acid. It is sometimes made from the dried berries. The leaves of the various species were smoked by the Indians.

19. Arctostaphylos pungens H. B. K. Nov. Gen. & Sp. 3: 278. 1819.

Baja California to Chihuahua, Coahuila, Veracruz, and Oaxaca; type collected near the City of Mexico. New Mexico to California.

Shrub, 1 to 3.5 meters high, the bark smooth, red-brown, the branchlets tomentulose; leaves broadly ovate to lanceolate or rounded, 1.5 to 3.5 cm. long, obtuse or acute, tomentulose when young; racemes very short and dense; corolla 7 mm. long; fruit brown, 5 to 8 mm. in diameter. "Manzanita" (California); "manzanilla" (Durango, Sinaloa, Guanajuato); "pingüica" (Guanajuato, Morelos, Durango, Hidalgo, Jalisco); "palo de pingüica" (San Luis Potosí, Hidalgo, Sinaloa, Guanajuato, Oaxaca); "manzana," "tnu-ndido" (Oaxaca, *Seler*); "gayuba del país" (Hidalgo); "tepezquite," "tepeizquitl," "tepesquisuchil" (Nahuatl, from *tepe-izqui-xochitl*=mountain+toasted maize+flower); "pinquiqua" (Tarascan); "leño colorado" (Sonora, San Luis Potosí, Hidalgo).

The fruit is often eaten by people, and it is a favorite food of bear. It is often sold in the markets. Both the fruit and leaves are reputed to have astringent and diuretic properties, and they are employed as a remedy for dropsy, bronchitis, venereal diseases, and other affections.

6. ARBUTUS L. Sp. Pl. 395. 1753.

Shrubs or trees, the bark smooth, thin, peeling off in sheets; leaves alternate, persistent, petiolate, entire or serrate; flowers white or pink, in terminal panicles; calyx 5-lobate; corolla urceolate, with 5 small lobes; stamens 10, the anthers 2-awned; fruit baccate, globose, granular, 5-celled.

The Mexican plants of this genus are extremely variable and seem not to possess a single constant character. It appears probable that ultimately all of them will have to be considered mere forms of *A. xalapensis*. No confidence can be placed in the characters used in the following key. Of the species listed, the one most clearly distinct from *A. xalapensis* is *A. glandulosa*, but even the characters by which it can be recognized are far from constant.

Arbutus unedo L., a European species, has been erroneously reported in certain Mexican publications.

Petioles glandular-hirsute_____1. **A. glandulosa.**
Petioles glabrous or tomentose.
  Ovary glabrous.
    Leaves soon glabrous beneath_____2. **A. arizonica.**
    Leaves persistently tomentose beneath.
      Pubescence of the inflorescence eglandular_____3. **A. laurina.**
      Pubescence of the inflorescence partly of gland-tipped hairs.
        Calyx glabrous_____4. **A. peninsularis.**
        Calyx tomentulose_____5. **A. donnell-smithii.**
  Ovary pubescent.
    Calyx lobes triangular, acute or acuminate_____6. **A. spinulosa.**
    Calyx lobes broadly ovate or orbicular, obtuse_____7. **A. xalapensis.**

1. Arbutus glandulosa Mart. & Gal. Bull. Acad. Brux. 9[1]: 533. 1842.
Arbutus villosa Willd.; Klotzsch, Linnaea 24: 72. 1851.

Chihuahua to Veracruz, Chiapas, and Sinaloa; type from Ejutla, Oaxaca.

Shrub or tree, 3 to 8 meters high, with red-brown bark; leaves oblong to ovate or oval, 4 to 13 cm. long, acute or obtuse, acute to cordate at base, entire or serrate, tomentose or glabrate beneath; panicles 2 to 10 cm. long, glandular-hirsute; corolla 8 mm. long. "Nuzu-ndu" (Oaxaca, *Seler*); "madroño" (Oaxaca, Sinaloa); "aile" (Sinaloa).

2. Arbutus arizonica (A. Gray) Sarg. Gard. & For. 4: 317. 1891.
Arbutus xalapensis arizonica A. Gray, Syn. Fl. ed. 2. 2[1]: 396. 1886.

Chihuahua and Sonora to Jalisco and San Luis Potosí. Southern Arizona (type locality) and New Mexico.

Tree, 5 to 15 meters high, the trunk sometimes 60 cm. in diameter; bark thin, peeling off in red-brown papery sheets; leaves long-petiolate, oblong to ovate, 4 to 10 cm. long, obtuse or acute, pale beneath and glabrous, at least in age, usually entire; corolla white or pink, 8 mm. long; fruit 6 to 8 mm. in diameter, orange-red; wood soft, close-grained, reddish brown, its specific gravity about 0.71. "Madroño" (Chihuahua).

3. Arbutus laurina Mart. & Gal. Bull. Acad. Brux. 9[1]: 535. 1842.

Type from Yavezia, Oaxaca.

Tree with red-brown branches; leaves oblong or ovate-oblong, 3 to 9 cm. long, obtuse or acutish, narrowed or rounded at base, serrate, pubescent beneath; panicles 4 to 8 cm. long; corolla 6 to 7 mm. long.

4. **Arbutus peninsularis** Rose & Goldm. Contr. U. S. Nat. Herb. **13**: 312. 1911.
Type from Sierra de la Laguna, Baja California.
Tree; leaves short-petiolate, oval or oval-ovate, 5 to 11 cm. long, obtuse, rounded at base, entire or serrulate, lustrous above; corolla 6 to 7 mm. long.
Probably only a form of *A. arizonica*.

5. **Arbutus donnell-smithii** Small, N. Amer. Fl. **29**: 85. 1914.
Chiapas. Guatemala; type from San Lucas.
Tree, 4.5 to 6 meters high; leaves long-petiolate, oblong to ovate, 5 to 10 cm. long, obtuse or acute, rounded or obtuse at base, entire or serrulate; corolla 6 to 7 mm. long; fruit about 1 cm. in diameter.

6. **Arbutus spinulosa** Mart. & Gal. Bull. Acad. Brux. **9**[1]: 532. 1842.
Type from Monte Tancitaro, Michoacán.
Leaves oblong, oblong-lanceolate, or obovate, 4 to 7 cm. long, acute, rounded at base, serrate; corolla 6 to 7 mm. long.

7. **Arbutus xalapensis** H. B. K. Nov. Gen. & Sp. **3**: 279. 1819.
Arbutus densiflora H. B. K. Nov. Gen. & Sp. **3**: 280. 1819.
Arbutus mollis H. B. K. Nov. Gen. & Sp. **3**: 280. 1819.
Arbutus petiolaris H. B. K. Nov. Gen. & Sp. **3**: 281. 1819.
Arbutus laurifolia Lindl. Bot. Reg. **25**: *pl. 67*. 1839.
Arbutus varians Benth. Pl. Hartw. 77. 1841.
Arbutus floribunda Mart. & Gal. Bull. Acad. Brux. **9**[1]: 534. 1842.
Arbutus macrophylla Mart. & Gal. Bull. Acad. Brux. **9**[1]: 534. 1842.
Arbutus paniculata Mart. & Gal. Bull. Acad. Brux. **9**[1]: 535. 1842.
Arbutus prunifolia Klotzsch, Linnaea **24**: 73. 1851.
Arbutus texana Buckl. Proc. Acad. Phila. **1861**: 460. 1862.
Chihuahua and Nuevo León to Veracruz, Oaxaca, and Sinaloa; type from Jalapa, Veracruz. Guatemala; western Texas and southern New Mexico.
Shrub or tree, sometimes 15 meters high, the bark thin, red-brown, peeling off in large papery sheets; leaves oblong to ovate or oval, 3 to 10 cm. long, acute to rounded at apex, entire or serrate, usually tomentose beneath when young, glabrate in age; corolla white, 7 mm. long; fruit dark red, 8 to 10 mm. in diameter; wood hard, close-grained, reddish brown, its specific gravity about 0.75. "Madroño" (Chihuahua, Durango, Oaxaca, Mexico, Sinaloa, San Luis Potosí); "nuzu-ndu" (Oaxaca, *Seler*); "manzanita" (Durango).
The wood of this and other species is useful for various purposes.

DOUBTFUL SPECIES.

ARBUTUS OVATA Mart. & Gal. Bull. Acad. Brux. **9**[1]: 533. Type from Oaxaca. According to Small, probably a species of *Gaultheria*.

7. PERNETTIA Gaud. Ann. Sci. Nat. 5: 102. 1825.

1. **Pernettia ciliata** (Schlecht. & Cham.) Small, N. Amer. Fl. **29**: 82. 1914.
Gaultheria ciliata Schlecht. & Cham. Linnaea **5**: 126. 1830.
Pernettia pilosa G. Don, Hist. Dichl. Pl. **3**: 837. 1834.
Pernettia ciliaris G. Don, Hist. Dichl. Pl. **3**: 837. 1834.
Pernettia buxifolia Mart. & Gal. Bull. Acad. Brux. **9**[1]: 538. 1842.
Gaultheria hirsuta Mart. & Gal. Bull Acad. Brux. **9**[1]: 540. 1842.
Pernettia seleriana Loesener, Bull. Herb. Boiss. II. **3**: 217. 1903.
High mountains, Michoacán to San Luis Potosí, Veracruz, and Chiapas.
Low shrub, 60 cm. high or less, the branchlets hirsute; leaves alternate, short-petiolate, persistent, narrowly oblong to oval, 1 to 2.5 cm. long, acute

or obtuse, crenate-serrulate, setulose or glabrous beneath; flowers white or pink, in short few-flowered racemes; calyx 5-lobate, the lobes ovate or lanceolate; corolla urceolate, 5 to 7 mm. long; stamens 10, the anthers appendaged above; fruit a 5-celled berry, 6 to 7 mm. in diameter. "Capulincillo" (Mexico, Oaxaca); "arrayán" (Chiapas).

P. pentlandii DC., a South American species, known in Colombia as "maíz de perro," is said to have poisonous fruit.

130. VACCINIACEAE. Blueberry Family.

Shrubs or small trees, sometimes epiphytic and subscandent; leaves alternate, estipulate, persistent or deciduous, entire or serrate; flowers usually racemose, perfect; calyx tube adnate to the ovary, the limb 4 or 5-lobate or entire; corolla gamopetalous, 4 or 5-dentate, the lobes imbricate; stamens twice as many as the corolla lobes, epigynous or adherent to the base of the corolla, the anthers 2-celled, often awned; style filiform, the stigma simple; ovary inferior; fruit baccate.

Corolla campanulate, globose, or urceolate, small, less than 1 cm. long.
- Stamens included; corolla closed in bud——1. **VACCINIUM.**
- Stamens exserted; corolla open in bud——2. **POLYCODIUM.**

Corolla tubular, 1 to 2.5 cm. long.
- Filaments equal in length——3. **MACLEANIA.**
- Filaments unequal——4. **CAVENDISHIA.**

1. VACCINIUM L. Sp. Pl. 349. 1753.

Shrubs; leaves short-petiolate, persistent or deciduous, entire or serrate; flowers white or pink, solitary or in terminal or axillary racemes; calyx limb truncate or 5-dentate; corolla campanulate or urceolate, 4 or 5-dentate; stamens 8 or 10, the anthers often awned, opening by terminal pores; berry 5 or 10-celled.

The species occurring in the United States are known as blueberries or whortleberries, and sometimes erroneously as huckleberries.[1] All have edible fruit, although in some species the fruit is so small as to be worthless. Some of the blueberries afford one of the finest of all the native North American fruits. In recent years they have been greatly improved by cultivation.

Filaments glabrous; leaves deciduous——1. **V. geminiflorum.**
Filaments pubescent; leaves persistent.
- Flowers 4-parted——2. **V. consanguineum.**
- Flowers 5-parted.
  - Anthers awned.
    - Racemes leafy; corolla about 5 mm. long——3. **V. stenophyllum.**
    - Racemes naked; corolla about 2.5 mm. long——4. **V. leucanthum.**
  - Anthers not awned.
    - Corolla urceolate——5. **V. cordatum.**
    - Corolla campanulate——6. **V. confertum.**

1. Vaccinium geminiflorum H. B. K. Nov. Gen. & Sp. 3: 267. *pl. 252.* 1819.

High mountains, Jalisco to Veracruz and Oaxaca; type collected between Omitlán and Morán, Hidalgo.

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[1] This name should be restricted to species of the genus *Gaylussacia.*

Low shrub, less than 10 cm. high, the branches puberulent; leaves short-petiolate, oblong or oblong-obovate, 6 to 18 mm. long, obtuse, serrulate, glabrous or with a few stipitate glands beneath; flowers axillary, solitary; corolla 4 to 4.5 mm. long.

2. **Vaccinium consanguineum** Klotzch, Linnaea 24: 64. 1851.

Chiapas. Central America; type from Chiriquí Volcano, Panama.

Shrub or small tree, the branchlets puberulent or glabrate; leaves mostly elliptic-oblong, 1.5 to 3.5 cm. long, acute, crenate-serrate, glabrous or nearly so; racemes short and few-flowered or sometimes 4.5 cm. long; corolla urceolate, pink, 6 to 7 mm. long; fruit black, 5 to 7 mm. in diameter.

3. **Vaccinium stenophyllum** Steud. Nom. Bot. ed. 2. 2: 740. 1841.

Vaccinium angustifolium Benth. Pl. Hartw. 45. 1840. Not *V. angustifolium* Ait. 1789.

Vaccinium angustifolium glaucescens Benth. Pl. Hartw. 45. 1840.

Sinaloa, Tepic, and Jalisco; type from Bolaños, Jalisco.

Shrub, sometimes 3 meters high, the branches puberulent; leaves nearly sessile, elliptic-lanceolate to linear-oblong, 2 to 4.5 cm. long, acute or acuminate, glandular-serrulate or entire, lustrous, paler beneath; racemes terminal, very leafy. "Madroño chino," "mandroñito" (Sinaloa).

4. **Vaccinium leucanthum** Schlecht. Linnaea 8: 524. 1833.

?*Vaccinium schlechtendalii* Don, Hist. Dichl. Pl. 3: 856. 1834.

Vaccinium micranthum Dunal in DC. Prodr. 7: 568. 1839.

Michoacán to Veracruz, Hidalgo, Puebla, and Oaxaca; type from San Salvador, near Chiconquiaco, Veracruz.

Shrub, sometimes 4.5 meters high, the branches puberulent; leaves lanceolate or oblong-ovate, 2 to 4.5 cm. long, acute, glandular-serrate, glabrous or nearly so; racemes many-flowered, 3 to 6 cm. long; corolla globose or urceolate; fruit black, 5 mm. in diameter. "Axocopaconi" (Puebla); "cahuichi," "cahuitzi" (Hidalgo, Veracruz).

5. **Vaccinium cordatum** Hemsl. Biol. Centr. Amer. Bot. 2: 274. 1881.

Gaylussacia cordifolia Mart. & Gal. Bull Acad. Brux. 9[1]: 529. 1842. Not *Vaccinium cordifolium* Stapf, 1894.

Veracruz; type from Pedregal de Las Vegas, near Jalapa.

Erect shrub, the branchlets puberulent; leaves broadly ovate, 3 to 4.5 cm. long, obtuse, rounded or subcordate at base, crenate-serrate, nearly glabrous, pale beneath; racemes axillary, 2 to 3.5 cm. long; corolla 6.5 mm. long; fruit 5 mm. in diameter.

6. **Vaccinium confertum** H. B. K. Nov. Gen. & Sp. 3: 265. *pl. 250.* 1819.

Vaccinium criocladum Dunal in DC. Prodr.. 7: 571. 1839.

Vaccinium brachystachyum Benth. Pl. Hartw. 65. 1840.

Vaccinium discolor Mart. & Gal. Bull. Acad. Brux. 9[1]: 531. 1842.

Chihuahua to San Luis Potosí, Chiapas, and Sinaloa; type collected near Morán and Cerro de Oyamel, Hidalgo.

Shrub, 0.3 to 1 meter high, the branchlets puberulent or hirtellous; leaves oval to oblong-ovate, 6 to 15 mm. long, obtuse or acute, crenate-serrate, pale beneath and glandular; racemes few-flowered, equaling or shorter than the leaves; corolla white or pink, 3 to 4 mm. long; fruit black, 5 to 6 mm. in diameter.

2. POLYCODIUM Raf. Amer. Month. Mag. 2: 266. 1818.

The other species are natives of the eastern United States.

1. **Polycodium kunthianum** (Klotzsch) C. B. Robinson, Bull. Torrey Club 39: 559. 1912.

Vaccinium kunthianum Klotzsch, Linnaea 24: 56. 1851.

Hidalgo and Puebla; type collected between Pachuca and Real del Monte, Hidalgo.

Shrub, 15 to 60 cm. high, the branches hirtellous; leaves subsessile, deciduous, oval to elliptic-oblong, 1.5 to 3 cm. long, acute to rounded at apex, entire, hirtellous or glabrate, often glaucous beneath; flowers in short leafy racemes; corolla campanulate, 4 to 6 mm. long; stamens 10, exserted, the anthers awned.

Humbold, Bonpland, and Kunth referred the plant to *Vaccinium stamineum* L. (*Polycodium stamineum* Greene), a United States species. The fruit in this genus is not edible.

3. MACLEANIA Hook. Icon. Pl. *pl. 109.* 1837.

1. **Macleania insignis** Mart. & Gal. Bull. Acad. Brux. 9[1]: 531. 1842.

Mountains of Veracruz and Oaxaca; type from Mirador, Veracruz.

Shrub, epiphytic or terrestrial, glabrous; leaves subsessile, broadly ovate to ovate-oblong, 3 to 6.5 cm. long, obtuse; flowers axillary, fascicled, reflexed; calyx 5-winged, the limb with 5 short teeth; corolla red, tubular, 2.5 cm. long; stamens 10, equal, the anthers not awned; fruit a 5-celled berry.

4. CAVENDISHIA Lindl. Bot. Reg. 21: *pl. 1791.* 1836.

Shrubs or small trees, terrestrial or epiphytic; leaves persistent, coriaceous, entire; flowers large, axillary or terminal, racemose or subumbellate; calyx limb 5-dentate; corolla tubular, 5-dentate; stamens 10, equal in length, but the filaments alternately unequal, the anthers not awned; fruit a 5-celled berry.

Inflorescence short, umbel-like----------1. C. latifolia.
Inflorescence an elongate raceme.
  Corolla 2 to 2.5 cm. long----------2. C. acuminata.
  Corolla 1 to 1.5 cm. long.
    Leaves 2.5 to 4.5 cm. wide; petioles 2 to 4 mm. long------3. C. crassifolia.
    Leaves 4.5 to 6 cm. wide; petioles 7 to 13 mm. long------4. C. chiapensis.

1. **Cavendishia latifolia** Hemsl. Biol. Centr. Amer. Bot. 2: 273. 1881.

Type from Pueblo Nuevo (Tabasco ?).

Glabrous shrub; leaves short-petiolate, broadly ovate, 10 to 15 cm. long, 7.5 cm. wide or less, acuminate, 7 or 9-nerved; flowers 12 to 16 mm. long, long-pedicellate; calyx pink; corolla white.

2. **Cavendishia acuminata** (Hook.) Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 272. 1881.

?*Thibaudia mexicana* Mart. & Gal. Bull. Acad. Brux. 9[1]: 530. 1842.

Thibaudia acuminata Hook. in Curtis's Bot. Mag. *pl. 5752.* 1869.

Oaxaca. Central and South America.

Glabrous shrub; leaves short-petiolate, oblong-lanceolate, 8 to 12 cm. long, attenuate-acuminate, 5-nerved, paler beneath; racemes loose, many-flowered.

3. Cavendishia crassifolia (Benth.) Hemsl. Biol. Centr. Amer. Bot. 2: 273. 1881.

Thibaudia crassifolia Benth. Pl. Hartw. 65. 1841.

Oaxaca and Chiapas; type from Totontepec, Oaxaca. Guatemala.

Glabrous shrub; leaves ovate to oblong-lanceolate, 5 to 10 cm. long, long-acuminate, rounded at base, 5-nerved, lustrous; racemes many-flowered, the flowers long-pedicellate.

4. Cavendishia chiapensis T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 188. 1915.

Type from Cerro del Boquerón, Chiapas.

Glabrous epiphytic shrub; leaves oblong-ovate, 12 to 15 cm. long, 5 or 7-nerved, coriaceous; racemes 3 to 5.5 cm. long, the flowers long-pedicellate; corolla pale red, 1.5 cm. long; fruit 8 mm. in diameter.

131. THEOPHRASTACEAE. Theophrasta Family.

REFERENCE: Mez in Engl. Pflanzenreich IV. 236a. 1903.

Shrubs or trees; leaves alternate or pseudoverticellate, entire or serrate, estipulate; flowers perfect, racemose or umbellate, regular, usually 5-parted; calyx lobes free or short-connate, imbricate, rounded at apex; corolla gamopetalous, rotate or funnelform, fleshy; stamens 5, 5 staminodia also present; style simple, the stigma entire or nearly so; fruit baccate or drupaceous.

Staminodia ligulate; leaves not spine-tipped----------1. **DEHERAINIA.**
Staminodia petal-like; leaves spine-tipped----------2. **JACQUINIA.**

1. DEHERAINIA Decaisne, Ann. Sci. Nat. VI. 3: 138. 1876.

One other species is known, a native of Cuba.

1. Deherainia smaragdina (Planch.) Decaisne, Ann. Sci. Nat. VI. 3: 139. *pl. 12.* 1876.

Jacquinia smaragdina Planch.; Linden, Pl. Nouv. 8. 1859.

Tabasco.

Shrub, the branchlets rufous-villous; leaves petiolate, elliptic, about 15 cm. long and 5 cm. wide, subacuminate, entire, coriaceous, glabrous above, ferruginous-pubescent beneath; flowers solitary or fasciculate in the leaf axils, pedicellate, 16 to 20 mm. long, green; petals united to the middle, the lobes suborbicular, spreading.

2. JACQUINIA L.; Jacq. Stirp. Amer. 53. 1763.

Shrubs or trees; leaves entire, persistent, rigid, each tipped with a rigid spine, short-petiolate; flowers terminal, yellow or orange, 5-parted; corolla lobes spreading; staminodia inserted upon the corolla tube, resembling the corolla lobes but smaller; fruit ovoid or globose, large, cuspidate, few-seeded.

The following names are reported for species of uncertain identity: "Muyché" (Yucatán); "flor de Mayo" (Veracruz); "sixje" (Tabasco); "sicajan" (Chiapas). In South America some species are known as "barbasco." The plants are used widely in tropical America as fish poisons.

Flowers umbellate or fasciculate.
  Leaves mostly elliptic, about 2 cm. wide----------1. J. liebmannii.
  Leaves oblanceolate, about 8 mm. wide----------2. J. pringlei.
Flowers racemose.
  Leaves tomentose beneath----------3. J. seleriana.
  Leaves glabrous beneath.
    Connective produced beyond the anther cells as a short sharp point.
      4. J. pungens.

Connective not produced into a sharp point.
Staminodia 3 to 5 times as long as broad----------5. J. flammea.
Staminodia not more than twice as long as broad.
Filaments connate into a long tube free from the corolla.
6. J. schiedeana.
Filaments short-connate at base, not forming a tube free from the corolla.
Inflorescence corymb-like----------7. J. aurantiaca.
Inflorescence strictly racemose.
Racemes much longer than the leaves----------8. J. racemosa.
Racemes about as long as the leaves----------9. J. axillaris.

1. **Jacquinia liebmannii** Mez in Engl. Pflanzenreich IV. 236a: 38. 1903.
Type from Laguna Colorada and San Agustín.
Branchlets puberulent; leaves broadly elliptic or ovate-elliptic, about 4.5 cm. long, obtuse or acute at apex, rounded or obtuse at base, glabrous; inflorescence 1 to 3-flowered; fruit 1.7 to 2 cm. in diameter.

2. **Jacquinia pringlei** Bartlett, Proc. Amer. Acad. 44: 630. 1909.
Type from Iguala Canyon, Guerrero.
Small tree; leaves petiolate, 4 to 4.5 cm. long, acute, attenuate at base, glabrous; fruit 12 to 15 mm. in diameter.

3. **Jacquinia seleriana** Urb. & Loes. in Seler, Alt. Weg. Mex. 73. 1900.
Oaxaca; type material from San Carlos Yautepec and Rancho de los Pichones.
Branchlets tomentulose; leaves oblanceolate or linear-oblanceolate, 3 to 5 cm. long, acute to rounded at apex, attenuate at base, glabrous above, the margins revolute; flowers long-pedicellate, about 8 mm. broad; fruit 1 cm. in diameter. "Chilillo."
Used as a fish poison.

4. **Jacquinia pungens** A. Gray, Mem. Amer. Acad. n. ser. 5: 325. 1855.
Jacquinia donnell-smithii Mez in Engl. Pflanzenreich IV. 236a: 39. 1903.
Sonora to Veracruz and Chiapas; type from Sonora. Guatemala.
Shrub or small tree, usually 1 to 4 meters high, with very dense crown, the bark gray; leaves linear-lanceolate to elliptic-oblong or linear-oblong, 3 to 6 cm. long, acute, subsessile, rigid; flowers reddish yellow, about 7 mm. long, in short racemes; fruit 1.5 to 2 cm. in diameter. "San Juan" (Sinaloa); "San Juanito," "San Juanico" (Sonora); "pinicua" (Sonora, *Ramírez*); "rosadilla" (Oaxaca); "mata-peje," "luruche" (Guatemala)
McGee states that the Seri Indians of Sonora eat the green fruits, and when dry they employ them as rattle beads. The flowers, which are stiff and rigid, are strung as necklaces in some localities, and they are used to give a durable yellow dye to palm leaves and baskets. The fruit is much used along the west coast for stupefying fish.

5. **Jacquinia flammea** Millsp.; Mez in Engl. Pflanzenreich IV. 236a: 40. 1903.
Yucatán.
Branchlets glabrous; leaves oblong or obovate, 3 to 4.5 cm. long, rounded or obtuse at apex and minutely aciculate-pungent; racemes corymbiform, equaling or longer than the leaves; flowers orange, 8 to 10 mm. long.

6. **Jacquinia schiedeana** Mez in Engl. Pflanzenreich IV. 236a: 41. 1903.
Reported from Guerrero and Puebla, and from other localities of uncertain position.

Branchlets finely pubescent; leaves lanceolate, about 4.5 cm. long and 1.5 cm. wide, acute, subtriplinerved; inflorescence elongate-racemose, about as long as the leaves; flowers 8 to 10 mm. long.

7. Jacquinia aurantiaca Ait. Hort. Kew. ed. 2. 2: 6. 1811.

Jacquinia mexicana Regel, Ind. Sem. Hort. Petrop. 48. 1865.

Jacquinia arenicola T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 188. 1915.

Sinaloa to Tamaulipas, Veracruz, Tabasco, and Oaxaca. Central America and West Indies.

Shrub or small tree, 2 to 9 meters high, the branchlets pubescent; bark smooth; leaves oblong to elliptic, 3 to 6 cm. long, obtuse or acute; corymbs few-flowered; flowers orange, about 8 mm. long; fruit globose, about 2 cm. in diameter. "Palo de las ánimas" (Guerrero); "guie-zee," "flor del niño" (Oaxaca, *Seler*); "rosadilla," "rosadillo" (*Robelo*); "neucxochitl" (Nahuatl, "honey-flower," *Robelo*); "siche" (Tabasco); "ducuche" (Guatemala); "San Juan" (Sinaloa); "barbasco," "limoncillo," "escorpioncillo," "mirra," "espino ruco," "crucillo" (El Salvaor).

The flowers are said to be eaten by birds. Palmer reports that in Guerrero the powdered bark is mixed with salt and applied to sores upon animals. The crushed fruit is employed extensively in Mexico and Central America for poisoning fish.

The tree is described and figured by Hernández[1] as "hoitzxochitl," or "arbor lonchifolia." The bark, he states, was employed as a remedy for venereal diseases; a decoction of the seeds as a remedy for headache and toothache. He states that other names for the plant were "xochipaltic," "neuhxochitl," and "hoatzinxochitl."

8. Jacquinia racemosa DC. Prodr. 8: 150. 1844.

Type from Tampico, Tamaulipas.

Branchlets puberulent; leaves lanceolate, about 5 cm. long and 1.5 cm. wide, acute, 1-nerved; racemes about 7-flowered, the flowers 7 mm. long.

9. Jacquinia axillaris Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1861: 121. 1861.

Veracruz and Oaxaca; type from Papantla, Veracruz.

Branchlets puberulent; leaves lanceolate to elliptic-oblong, 5 to 7.5 cm. long, acute, triplinerved; flowers orange, 7 to 10 mm. long.

EXCLUDED SPECIES.

Mez reports *J. angustifolia* Oerst. and *J. submembranacea* Mez from Mexico, but this is merely through ignorance concerning the localities, which should be Costa Rica and Nicaragua, respectively.

132. MYRSINACEAE. Myrsine Family.

REFERENCE: Mez in Engl. Pflanzenreich IV. 236. 1902.

Shrubs or trees; leaves estipulate, alternate, entire, crenate, or serrate, punctate or lineolate; flowers small, white or pink, perfect, 5 or 4-parted; calyx inferior, the segments free or short-connate, usually punctate; petals usually united, the corolla rotate, the lobes valvate or dextrorsely convolute; stamens as many as the corolla segments and opposite them, usually attached to the corolla; style simple, the stigma punctiform or capitate; fruit baccate or drupaceous.

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[1] Thesaurus 39. 1651.

Petals distinct----------1. **HEBERDENIA.**
Petals united.
Flowers fasciculate in the leaf axils----------2. **RAPANEA.**
Flowers paniculate.
Style short and stout----------3. **STYLOGYNE.**
Style long and slender.
Ovules pluriseriate; petals dextrorsely convolute, usually glabrous.
4. ICACOREA.
Ovules uniseriate; petals valvate, pubescent--------**5. PARATHESIS.**

1. **HEBERDENIA** Banks; DC. Ann. Sci. Nat. II. 16: 79. 1841.

One other species is known, a native of Madeira and the Canaries.

1. **Heberdenia penduliflora** (DC.) Mez in Engl. Pflanzenreich IV. 236: 159. 1902.
Myrsine penduliflora DC. Trans. Linn. Soc. Bot. **17:** 110. 1834.
Veracruz, Puebla, and Oaxaca.
Glabrous shrub; leaves short-petiolate, oblong-elliptic or elliptic, 3.5 to 8 cm. long, obtuse, cuneate at base, lustrous, entire; flowers 5-parted, in axillary fascicles, about 3.5 mm. long; sepals rounded; petals rounded-elliptic, pink, puncticulate; fruit globose, about 5 mm. in diameter, tipped by the slender persistent style.

2. **RAPANEA** Aubl. Pl. Guian. 121. 1775.

Shrubs or trees; leaves entire; flowers small, clustered in the leaf axils, bracteolate, 4 or 5-parted; sepals short-connate, ciliolate; petals short-connate, spreading or recurved; stamens inserted in the throat of the corolla; fruit dry or fleshy, 1-seeded.

Branchlets glabrous.
Leaves obtuse or subacute, prominulous-reticulate beneath.
1. R. jurgensenii.
Leaves rounded at apex, not reticulate----------**2. R. guianensis.**
Branchlets short-pilose----------**3. R. ferruginea.**

1. **Rapanea jurgensenii** Mez in Engl. Pflanzenreich IV. 236: 388. 1902.
Tepic to Oaxaca; type from Sierra San Pedro Nolasco, Oaxaca.
Glabrous shrub; leaves short-petiolate, oblong or oblong-oblanceolate, 8 to 12 cm. long, obtuse or subacute, attenuate at base, coriaceous; inflorescence 5 to 9-flowered, shorter than the petiole, the flowers less than 2 mm. long; petals punctate.

2. **Rapanea guianensis** Aubl. Pl. Guian. 121. *pl. 46.* 1775.
Myrsine rapanea Roem. & Schult. Syst. Veg. 4: 509. 1819.
Myrsine guianensis Kuntze, Rev. Gen. Pl. 2: 402. 1891.
Chiapas and probably elsewhere. Florida, West Indies and South America.
Shrub or small tree, sometimes 6 meters high, with a trunk 16 cm. in diameter, the bark thin, close, grayish; leaves oblong or obovate, 4 to 10 cm. long, cuneate at base, coriaceous, lustrous above, the margins revolute; inflorescences 3 to 7-flowered, shorter than the petioles, the flowers 2 to 2.5 mm. long; sepals and petals spotted and striped with purple; fruit globose, black or bluish, about 4 mm. in diameter; wood hard, strong, close-grained, light yellowish brown. "Badula," "mameyuelo" (Porto Rico).

3. **Rapanea ferruginea** (Ruiz & Pav.) Mez in Urb. Symb. Antill. **2**: 429. 1901.
Caballeria ferruginea Ruiz & Pav. Syst. Veg. Peruv. Chil. 250. 1798.
Myrsine ferruginea Spreng. Syst. Veg. **1**: 664. 1825.
Myrsine myricoides Schlecht. Linnaea **8**: 525. 1833.

Durango to Tepic, Oaxaca, and Veracruz. West Indies; Central and South America; type from French Guiana.

Shrub or small tree, 4 to 8 meters high; leaves slender-petiolate, lanceolate or oblanceolate, 5 to 12 cm. long, acute, attenuate at base, pubescent or glabrate beneath, thin; inflorescences 3 to 9-flowered, the flowers 2 to 3.5 mm. long; fruit 2 to 3 mm. in diameter, black. "Laurel chino" (Durango); "ratón" (Costa Rica); "arrayán," "arrayán bobo," "badula," "cucúbano," "mameyuelo" (Porto Rico).

3. STYLOGYNE DC. Ann. Sci. Nat. II. **16**: 78. 1841.

1. **Stylogyne laevis** (Oerst.) Mez in Engl. Pflanzenreich IV. **236**: 268. 1902.
Ardisia laevis Oerst. Nat. For. Kjöbenhavn Vid. Medd. **1861**: 125. 1861.

Tabasco. Central America; type from Volcán de Irazú, Costa Rica.

Branchlets glabrous; leaves petiolate, elliptic or oblong-elliptic, about 12 cm. long and 5 cm. wide, short-acuminate, acute at base, entire, coriaceous, glabrous; flowers corymbose, in terminal panicles, glabrous, about 4 mm. long, 5-parted; sepals ovate, rounded at apex, short-connate; petals subelliptic, acute, punctate; stamens much shorter than the petals; ovary glabrous.

4. ICACOREA Aubl. Pl. Guian. **2**: Suppl. 1. 1775.

Shrubs or trees; leaves petiolate, entire, crenate, or serrate; flowers small, white or pink, 5-parted; sepals free or short-connate; petals short-connate, the lobes spreading or recurved, dextrorsely imbricate; stamens inserted at the base of the corolla tube; fruit globose, 1-seeded, bearing the persistent style at the apex.

Bracts ovate or elliptic, but caducous; flowers in racemes or spikes upon the branches of the panicle.
- Sepals dextrorsely imbricate.
  - Petals conspicuously biseriate-lineate ---- **1. I. karwinskyana.**
  - Petals punctulate at apex, elsewhere furnished with a few pale obscure lines ---- **2. I. lindenii.**
- Sepals imbricate or quincuncial, not dextrorsely imbricate.
  - Stamens shorter than the petals ---- **3. I. revoluta.**
  - Stamens equaling or longer than the petals.
    - Flowers racemose ---- **4. I. paniculata.**
    - Flowers spicate ---- **5. I. spicigera.**

Bracts minute, triangular or scalelike; flowers in corymbs or umbels in the panicle.
- Filaments glandular-pubescent; sepals and petals with numerous slender lines ---- **6. I. nigrescens.**
- Filaments glabrous; sepals and petals punctate or with broad lines.
  - Leaves closely pectinate-dentate, the teeth very acute.
    - Sepals and ovary punctate ---- **7. I. pellucida.**
    - Sepals and ovary not punctate ---- **8. I. pectinata.**
  - Leaves entire or crenulate.
    - Sepals ciliate ---- **9. I. crenipetala.**
    - Sepals not ciliate.
      - Anthers elliptic; leaves crenate ---- **10. I. liebmannii.**
      - Anthers linear; leaves entire ---- **11. I. compressa.**

1. Icacorea karwinskyana (Mez) Standl.

Ardisia karwinskyana Mez in Engl. Pflanzenreich IV. 236: 85. 1902.

Type from Ixcatlán, Oaxaca.

Branchlets glabrous; leaves obovate or broadly oblong, about 20 cm. long and 8.5 cm. wide, rounded at apex (?), acute at base, entire, glabrous; flowers racemose, the panicles many-flowered, much shorter than the leaves; buds 6 to 7 mm. long; sepals broadly ovate, ciliolate.

2. Icacorea lindenii (Mez) Standl.

Ardisia lindenii Mez in Engl. Pflanzenreich IV. 236: 86. 1902.

Type from Poyapatengo, Tabasco.

Branchlets glabrous; leaves obovate, about 11 cm. long and 5 cm. wide, acute at base, entire, glabrous; panicles few-flowered, the flowers racemose; buds 7 mm. long, glabrous; sepals broadly ovate, rounded at apex, ciliate.

3. Icacorea revoluta (H. B. K.) Standl.

Ardisia revoluta H. B. K. Nov. Gen. & Sp. 3: 246. 1819.

Ardisia bracteosa DC. Trans. Linn. Soc. Bot. 17: 127. 1834.

Ardisia scopulina T. S. Brandeg. Zoe 5: 215. 1905.

Sinaloa to Durango, Veracruz, and Oaxaca; type from La Venta de Moxonera. Central America.

Shrub or tree, 2 to 10 meters high, glabrous; leaves short-petiolate, elliptic or obovate, 9 to 19 cm. long, obtuse or acute, acute at base, entire; panicles equaling the leaves, the flowers racemose, long-pedicellate; sepals ovate, rounded at apex; corolla pinkish white; fruit globose, 4 to 5 mm. in diameter. "Laurel," "laurel de la sierra," "mangle," "pimientilla" (Sinaloa); "negrito" (Durango, *Patoni*); "camaca," "sirasil" (Oaxaca, Chiapas, *Seler*); "capulín manso" (Veracruz, *Urbina*); "capulín" (Colima); "uva" (El Salvador, Nicaragua); "guastomate," "fruta de pava" (Costa Rica); "arrayán" (Mexico, *Mez*); "cerezo" (El Salvador).

The fruit is edible.

4. Icacorea paniculata (Nutt.) Sudw. Gard. & For. 6: 324. 1893.

Cyrilla paniculata Nutt. Amer. Journ. Sci. 5: 290. 1822.

Ardisia escallonioides Schlecht. & Cham. Linnaea 6: 393. 1831.

Ardisia pickeringia Torr. & Gray; DC. Prodr. 8: 124. 1844.

Tamaulipas, San Luis Potosí, Veracruz, Oaxaca, and Chiapas. Florida, West Indies, and Guatemala.

Shrub or small tree, sometimes 7.5 meters high, with a trunk 15 cm. in diameter, the bark thin, light gray or white, scaly; leaves obovate or elliptic, 6 to 12 cm. long, obtuse or acute, acute at base, entire, glabrous; flowers fragrant, the panicles 5 to 12 cm. long; fruit globose, 4 to 8 mm. in diameter, black and shining; wood hard, brown, marked with darker bands, its specific gravity about 0.86. "Huitumbio" (Chiapas); "morita" (Oaxaca); "xook num" (Yucatán, Maya, *Seler*).

5. Icacorea spicigera (Donn. Smith) Standl.

Ardisia spicigera Donn. Smith, Bot. Gaz. 27: 434. 1899.

Type from Comitán, Chiapas.

Branchlets glabrous; leaves oblong-elliptic, about 12 cm. long and 4 cm. wide, acute, entire, glabrous; panicles many-flowered, longer than the leaves; buds 5 to 6 mm. long.

6. Icacorea nigrescens (Oerst.) Standl.

Ardisia nigrescens Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1861: 130. *pl.* 2. 1861.

Veracruz; type material collected near Colipa and Jacaltepec.

Branchlets tomentose; leaves elliptic-lanceolate, about 6 cm. long and 2 cm. wide, short-acuminate, acutish or rounded at base, glabrous above, strigose or glabrate beneath; inflorescence few-flowered, terminal and axillary, often simple and consisting of 2 to 4 umbellate flowers; buds 6 mm. long; sepals ovate, acutish.

7. **Icacorea pellucida** (Oerst.) Standl.

Ardisia pellucida Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1861: 130. *pl. 2.* 1861.

Type from Pital, Veracruz. Guatemala.

Leaves oblong, about 25 cm. long and 8 cm. wide, short-acuminate, acute at base, glabrous; panicles few-flowered, much shorter than the leaves, the flowers corymbose; sepals broadly ovate, acute.

8. **Icacorea pectinata** (Donn. Smith) Standl.

Ardisia pectinata Donn. Smith, Bot. Gaz. 12: 132. 1887.

Tabasco. Type from Pansamalá, Guatemala.

Leaves elliptic, about 28 cm. long and 12 cm. wide, acuminate, acute at base, glabrous; panicles many-flowered, much shorter than the leaves, the flowers corymbose, 5 mm. long, glabrous; sepals ovate, acutish, ciliate.

9. **Icacorea crenipetala** (Mez) Standl.

Ardisia crenipetala Mez in Engl. Pflanzenreich IV. 236: 91. 1902.

Veracruz and Chiapas; type from Orizaba.

Branchlets puberulent; leaves elliptic or oblong-oblanceolate, 9 to 14 cm. long, 4 to 5 cm. wide, acuminate, acute at base, crenate, glabrous; panicles pyramidal, few-flowered; buds 5 mm. long; sepals narrowly triangular, acutish.

10. **Icacorea liebmannii** (Oerst.) Standl.

Ardisia liebmannii Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1861: 129. *pl. 2.* 1861.

Veracruz; type from Amatlán.

Branchlets puberulent; leaves elliptic-lanceolate or oblong-lanceolate, about 12 cm. long and 3.5 to 4 cm. wide, acuminate, acute or obtuse at base; panicles many-flowered, corymbiform, shorter than the leaves; buds 4 mm. long, glabrous; sepals broadly ovate.

11. **Icacorea compressa** (H. B. K.) Standl.

Ardisia compressa H. B. K. Nov. Gen. & Sp. 3: 245. 1819.

Ardisia capollina DC. Trans. Linn. Soc. Bot. 17: 116. 1834.

Sinaloa to Oaxaca and Veracruz. Central and South America.

Shrub or small tree, the branchlets glabrous or nearly so; leaves lanceolate to oblong or elliptic, 6 to 15 cm. long, acute or acuminate, acute at base, glabrous; panicles terminal and axillary, longer or shorter than the leaves, the flowers white, 5 to 6 mm. long, glabrous; sepals ovate-elliptic; fruit globose, red or black, about 6 mm. in diameter. "Laurelillo" (Sinaloa); "capulín silvestre," "chico correoso" (Veracruz); "capulincillo" (Veracruz, Oaxaca); "tucuico" (Costa Rica); "capulín de tejón," "capulín de mayo" (Veracruz); "cerezo," "cerecilla," "cotomate," "cerecita" (El Salvador).

The fruit is edible and has an acid flavor.

5. **PARATHESIS** Hook. f.; Benth. & Hook. Gen. Pl. 2: 645. 1876.

Shrubs or small trees; leaves petiolate, entire or crenulate; flowers small, 5-parted, in terminal or axillary panicles, usually pink; sepals minute, connate below; corolla rotate, the lobes linear or oblong, valvate; fruit small, globose, 1-seeded.

Panicles axillary.
Ovary and style glabrous----1. P. oerstediana.
Ovary or base of style, or both, pubescent.
Leaves 3.5 to 9 cm. long.
Buds 2.5 mm. long; inflorescence simple or once branched--2. P. tenuis.
Buds 4 mm. long; inflorescence twice branched----3. P. rekoi.
Leaves 11 to 18 cm. long----4. P. melanosticta.
Panicles terminal.
Ovary pubescent, at least at apex----5. P. serrulata.
Ovary glabrous.
Flower buds 7 to 8 mm. long----6. P. chiapensis.
Flower buds 5 mm. long or less.
Leaves glabrous----7. P. corymbosa.
Leaves thinly stellate-pubescent beneath----8. P. lanceolata.

1. **Parathesis oerstediana** Mez in Engl. Pflanzenreich IV. 236: 178. 1902.
Type from Tontalcingo.
Branchlets ferruginous-tomentulose; leaves obovate, about 19 cm. long and 8.5 cm. wide, acute or acuminate, attenuate to base, entire, thin, glabrous above, stellate-pubescent or glabrate beneath; panicles many-flowered, equaling or shorter than the leaves; buds 4 mm. long, puberulent.

2. **Parathesis tenuis** Standl., sp. nov.
Type collected somewhere in southern Mexico, probably in Oaxaca or Veracruz (*Liebmann* 14; U. S. Nat. Herb. no. 1012707).
Branchlets slender, minutely brown-tomentulose; petioles 3 to 9 mm. long; leaves elliptic or lance-elliptic, 3.5 to 5.5 cm. long, 1.3 to 2 cm. wide, abruptly obtuse-acuminate, cuneate-acuminate at base, entire, thin, glabrous; panicles few-flowered, once branched, or the flowers merely racemose, the inflorescence slightly shorter than the leaves, on a long filiform peduncle, the pedicels filiform, 5 to 9 mm. long; buds 2.5 mm. long, minutely tomentulose; ovary puberulent.

3. **Parathesis rekoi** Standl., sp. nov.
Type from Cafetal Soledad, Cerro Espino, Oaxaca, altitude 800 meters (*Reko* 3335; U. S. Nat. Herb. no. 842483).
Branchlets minutely tomentulose; petioles slender, 10 to 14 mm. long; leaf blades obovate-elliptic, 5.5 to 9 cm. long, 2.5 to 3.5 cm. wide, obtusely short-acuminate, cuneate at base, thin, entire or undulate-crenate, sparsely appressed, stellate-pubescent or glabrate; panicles axillary, twice branched, lax, many-flowered, 10 to 13 cm. long, the flowers long-pedicellate; buds 4 mm. long, granular-puberulent; sepals punctate; anthers 1 mm. long, acuminate, purple-punctate dorsally; ovary glabrous, the style puberulent.

4. **Parathesis melanosticta** (Schlecht.) Hemsl. Biol. Centr. Amer. Bot. 2: 291. 1881.
Ardisia melanosticta Schlecht. Linnaea 8: 526. 1833.
Veracruz, Oaxaca, and Chiapas; type collected between San Salvador and Jalapa, Veracruz. Guatemala.
Branchlets ferruginous-tomentose; leaves oblanceolate or oblanceolate-elliptic, 10 to 18 cm. long, acuminate, attenuate at base, entire or crenulate, tomentulose or glabrate beneath; panicles many-flowered, equaling or shorter than the leaves; buds 4 to 5 mm. long, puberulent.

5. **Parathesis serrulata** (Swartz) Mez in Urban, Symb. Antill. 2: 403. 1901.
Ardisia serrulata Swartz, Prodr. Veg. Ind. Occ. 48. 1788.
Ardisia crenulata Vent. Choix Pl. Cels 5. *pl.* 5. 1803.

Parathesis crenulata Hook. f.; Hemsl. Biol. Centr. Amer. Bot. 2: 291. 1881.
Parathesis reflexa T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 189. 1915.

Tepic to San Luis Potosí, Veracruz, Oaxaca, and Chiapas. West Indies, Central America, and northern South America.

Shrub, 1 to 2.5 meters high, the branchlets ferruginous-tomentulose; leaves petiolate, oblanceolate, oblong, or elliptic-lanceolate, 10 to 20 cm. long, acuminate, attenuate or acute at base, entire or crenulate, glabrous above, beneath glabrous or stellate-tomentulose; panicles many-flowered, shorter or longer than the leaves; flowers pink, the buds about 4 mm. long, tomentulose; fruit globose, bluish black. "Cugía" (Nicaragua); "cinco negritos" (Chiapas); "rasca-garganta," "seca-garganta" (Porto Rico); "jalapón" (Santo Domingo).

The fruit is edible.

6. **Parathesis chiapensis** Fernald, Proc. Amer. Acad. 36: 497. 1901.

Chiapas; type collected between San Martín and Ococingo.

Branchlets ferruginous-tomentose; leaves elliptic, about 17 cm. long and 7 cm. wide, acuminate, crenulate, coriaceous, glabrous above, stellate-tomentulose beneath; panicles pyramidal, longer than the leaves; buds tomentose. "Telinté."

7. **Parathesis corymbosa** Hemsl. Biol. Centr. Amer. Bot. 2: 191. 1881.

Guerrero, Oaxaca, Veracruz, and Yucatán; type from Sierra San Pedro Nolasco, Oaxaca.

Shrub, sometimes 4 meters high; leaves elliptic or oblong-obovate, 13 cm. long and 5 cm. wide or smaller, acute, attenuate to base, entire, thin; panicles many-flowered, pyramidal, the flowers pink; buds tomentulose.

8. **Parathesis lanceolata** T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 188. 1915.

Chiapas; type from Finca Irlanda.

Branchlets ferruginous-tomentose; leaves elliptic or elliptic-lanceolate, 8 to 17 cm. long, long-acuminate, attenuate to base, entire or crenulate, thin, glabrous above, stellate-tomentulose or glabrate beneath; panicles equaling or shorter than the leaves, tomentulose.

133. PLUMBAGINACEAE. Plumbago Family.

1. PLUMBAGO L. Sp. Pl. 151. 1753.

REFERENCE: Boissier in DC. Prodr. 12: 690–694. 1848.

Plants herbaceous or fruticose, subscandent; leaves alternate, entire, estipulate; flowers spicate, bracteate and bracteolate, blue or white; calyx tubular, glandular, 5-dentate, 5-costate; corolla salverform, with a slender tube, the limb 5-lobate; stamens 5, free from the corolla, the anthers oblong-linear; style filiform, 5-branched; fruit a capsule, circumscissile near the base.

Plumbago capensis Thunb., a native of South Africa, with showy blue flowers, is cultivated in Mexico. In El Salvador it is known as "umbela" and "lumbela."

Corolla white, the tube twice as long as the calyx, the lobes retuse or obtuse; calyx with glands extending to the base ..... **1. P. scandens.**
Corolla blue, the tube one and one-half times as long as the calyx or shorter, the lobes acute; calyx without glands below ..... **2. P. pulchella.**

1. Plumbago scandens L. Sp. Pl. ed. 2. 215. 1762.
Plumbago mexicana H. B. K. Nov. Gen. & Sp. 2: 221. 1817.

Nearly throughout Mexico. Widely distributed in tropical America.

Plants suffrutescent, subscandent, 1 to 3 meters high, glabrous except in the inflorescence; leaves short-petiolate, oblong to ovate, acuminate, acute at base; spikes long and slender, many-flowered; calyx about 1 cm. long; corolla 2.5 to 3.5 cm. long. "Canutillo" (Sinaloa); "hierba de alacrán" (Sinaloa, Jalisco, Oaxaca, San Luis Potosí, Guanajuato); "hierba del negro" (*Conzatti*); "lagaña de perro" (Morelos, *Seler*); "chapak" (Yucatán, Maya, *Seler*); "pitillo" (flower), "turicua" (Tamaulipas); "dentelaria" (Oaxaca, *Reko*); "tlalchichinolli," "tlepatli" (Nahuatl); "embeles," "jazmín azul" (Yucatán); "beleza," "veleza enredadera," "meladillo," "higuillo" (Porto Rico); "centella," "hierba del diablo" (Colombia); "pegajoso" (Tamaulipas, Sinaloa); "guacochile" (El Salvador).

The leaves and root when applied to the skin produce almost instant rubefaction and in a very short time blisters. Taken internally they are poisonous. A decoction is applied externally for erysipelas, itch, and similar affections. *Plumbago europaea* L., of Europe, has similar properties. It is used internally as an emetic. When chewed, the plant excites the flow of saliva. The root has long been employed to relieve toothache, hence the French name of "dentelaire." Beggars are said sometimes to employ the leaves to raise sores upon the body for the purpose of exciting pity.

This species was listed by Sessé and Mociño as *P. zeylanica*, an Old World species.

2. **Plumbago pulchella** Boiss. in DC. Prodr. 12: 692. 1848.

Plumbago lanceolata Sessé & Moc. Fl. Mex. 31. 1893.

Durango to Veracruz and Oaxaca; type from the City of Mexico.

Plants herbaceous or suffrutescent, subscandent, glabrous except in the inflorescence; leaves petiolate, ovate, acute, acute or attenuate at base; spikes many-flowered, lax; calyx about 6 mm. long; corolla 10 to 15 mm. long. "Pañete" (Querétaro, Mexico); "jiricua" (Mexico, Guanajuato); "dominguilla" (Durango); "cola de iguana" (Mexico); "tiricua" (Guanajuato); "hierba del negro" (Oaxaca); "cola de pescado" (Mexico); "curiqua" (Michoacán, Tarascan, *León*); "chililló" (Oaxaca, *Ramírez*); "hierba del alacrán" (Zacatecas); "hierba lumbre" (Oaxaca, Zacatecas); "tianquiz" (Querétaro, *Ramírez*); "tlepatli" ("fire-medicine"), "tlachichinol" (Nahuatl).

This is employed in Mexico like *P. scandens*, especially for toothache and to destroy ulcers. It is also used popularly as a remedy for rheumatism.

134. SAPOTACEAE. Sapote Family.

Shrubs or trees, sometimes armed with spines, the sap often milky; leaves alternate, entire, petiolate, estipulate, usually persistent; flowers axillary or lateral, small, white or greenish, perfect; sepals 4 to 12, imbricate; corolla gamopetalous, appendages often present between the lobes; stamens as many as the corolla lobes, borne upon the corolla, usually alternating with staminodia; ovary 4 to 12-celled, the styles united, the ovules solitary; fruit baccate or drupaceous, small or large.

Staminodia none.....1. **CHRYSOPHYLLUM.**
Staminodia present.
  Appendages (2) present between the corolla lobes.
    Ovary glabrous; endosperm abundant.....2. **DIPHOLIS.**
    Ovary hairy; endosperm scant or none.....3. **BUMELIA.**

Appendages of the corolla none.
Ovary 10 to 12-celled; flowers solitary in the leaf axils_____4. **ACHRAS.**
Ovary 4 to 5-celled; flowers usually fasciculate in the axils, or lateral.
Sepals 8 to 10_____5. **CALOCARPUM.**
Sepals 4 to 6.
Endosperm none; flowers axillary_____6. **LUCUMA.**
Endosperm abundant; flowers usually lateral on old wood.
7. SIDEROXYLON.

1. CHRYSOPHYLLUM L. Sp. Pl. 192. 1753.

Trees with milky juice; leaves with numerous close parallel lateral nerves, estipulate; flowers fasciculate at the nodes or in the axils, pedicellate; sepals 5 or 6; corolla tubular-campanulate, the limb 5 or 6-lobate; staminodia none; ovary 4 to 11-celled; fruit baccate or drupaceous.

Flowers small, about 2 mm. long; corolla glabrous_____1. **C. mexicanum.**
Flowers larger, about 4 mm. long; corolla sparsely or densely sericeous.
Leaves glabrous on the upper surface; fruit containing several seeds.
2. C. cainito.
Leaves ferruginous-tomentulose on the upper surface; fruit 1-seeded.
3. C. tepicense.

1. Chrysophyllum mexicanum T. S. Brandeg., sp. nov.

Oaxaca, Veracruz, and Yucatán; type from Zacuapan, Veracruz (*Purpus* 7679; U. S. Nat. Herb. no 877540). Also in El Salvador.

Petioles 5 to 10 mm. long; leaf blades oval to oblong-elliptic, 5.5 to 12 cm. long, 2.5 to 5 cm. wide, obtuse to short-acuminate, obtuse or acute at base, with very numerous close straight lateral nerves, glabrous above, sericeous beneath, the hairs closely appressed, dense or sparse, grayish or brownish, lustrous; flowers 5-parted, few or numerous, the pedicels 3 to 5 mm. long; sepals orbicular, about 1 mm. long, sericeous; corolla 1.5 to 2 mm. long, glabrous; fruit 1-seeded. "Caimito," "zapote caimito," "canela," "palo de canela" (Oaxaca); "zapoyillo," "guayabillo" (El Salvador).

This has smaller flowers than any of the West Indian species. *Liebmann* 308, *Purpus* 8038, and *Gaumer* 896 are referred here. Mature fruit has not been seen.

2. Chrysophyllum cainito L. Sp. Pl. 192. 1753.

Yucatán; cultivated (?) in Guerrero. West Indies, Central America, and Colombia.

Tree, 8 to 15 meters high; leaves oval or broadly elliptic to oblong, 7 to 15 cm. long, abruptly short-acuminate, bright green above, golden or brownish-sericeous beneath, the pubescence very dense and lustrous; flowers greenish; stigma 8 to 11-lobed; fruit the size of an apple, globose, white to purple, with milky sweet flesh, containing several large brown seeds. "Caimito" (Yucatán, Guerrero, Central America, Cuba, Santo Domingo); "cayumito" (Yucatán).

The wood is said to be rather coarse and purplish gray, with a specific gravity of 0.88; it is of little value. The star-apple is cultivated for its fruit, which is highly valued in some parts of tropical America. The fruit is eaten raw. The name star-apple is derived from the fact that when the fruit is cut transversely, the seeds are seen to raidate like the points of a star. The tree is perhaps not a native of Yucatán but only in cultivation there.

3. Chrysophyllum tepicense Standl., sp. nov.

Type from Acaponeta, Tepic (*Rose* 1456; U. S. Nat. Herb. no. 300289).

Branchlets brownish-tomentulose; leaves (very immature) on petioles 1.5 to 2 cm. long, the blades oblong-elliptic, 3.5 to 4 cm. long, 1.7 to 2 cm. wide, obtuse or rounded at base and apex, densely brown-tomentulose on both surfaces; flowers borne on defoliate nodes of old branchlets, numerous in each cluster, the pedicels 8 to 10 mm. long, puberulent; sepals 5, orbicular, 2 mm. long, minutely sericeous; corolla 3.5 mm. long, greenish, sparsely sericeous; fruit oval, about 3 cm. long and 2 cm. thick, 1-seeded; seed brown, smooth, about 2.2 cm. long, the hilum near the apex on the ventral side, 8 mm. long and 3.5 mm. wide.

2. DIPHOLIS A. DC. in DC. Prodr. 8: 188. 1844.

1. Dipholis salicifolia (L.) A. DC. in DC. Prodr. 8: 188. 1844.

Achras salicifolia L. Sp. Pl. ed. 2. 470. 1762.

Veracruz, Oaxaca, and Yucatán. West Indies and southern Florida.

Slender unarmed tree, sometimes 16 meters high, with a trunk 50 cm. in diameter, the bark scaly; leaves slender-petiolate, oblong, lanceolate, or elliptic-oblanceolate, 6 to 12 cm. long, acute or acuminate, thinly sericeous when young but soon glabrate; flowers in dense, lateral or axillary fascicles, the pedicels 2 to 3 mm. long; sepals sericeous, 1.5 mm. long; fruit ovoid or subglobose, black, 6 to 8 mm. in diameter; wood hard, strong, fine-grained, dark brown or reddish, its specific gravity about 0.93. "Xac-chum" (Yucatán, Maya); "jocuma," "almendro silvestre," "jocuma blanca," "cuyá," "carolina" (Cuba); "almendrón," "tabloncillo" (Porto Rico).

Known in the British West Indies as "bustic," "wild cassada," and "cassada-wood."

3. BUMELIA Swartz, Prodr. Veg. Ind. Occ. 49. 1788.

Shrubs or trees, usually armed with spines or with spinose branchlets; leaves persistent or deciduous; flowers small, green or white, fasciculate, lateral or axillary; sepals 5, unequal; corolla 5-lobate, with 2 lobelike appendages in each sinus; staminodia petal-like; fruit 1-seeded.

Leaves tomentose beneath with loose matted hairs.
- Fruit and ovary densely tomentose ---- **1. B. eriocarpa.**
- Fruit and ovary glabrous or nearly so, or the ovary pilose with straight hairs.
  - Fruit 7 to 10 mm. long; leaves attenuate at base ---- **2. B. lanuginosa.**
  - Fruit about 2 cm. long; leaves rounded or obtuse at base.
    - Flowers sessile or subsessile ---- **3. B. subsessiliflora.**
    - Flowers pedicellate.
      - Leaves short-petiolate, rough and dull on the upper surface, the tomentum of the lower surface white or gray ---- **4. B. altamiranoi.**
      - Leaves long-petiolate, smooth and lustrous above, the tomentum ferruginous ---- **5. B. stenosperma.**

Leaves glabrous beneath or sericeous, the pubescence of straight closely appressed hairs.
- Leaves obovate or oblanceolate, broadest above the midle, cuneate or attenuate at base.
  - Pedicels glabrous ---- **6. B. spiniflora.**

Pedicels sericeous or tomentulose.
Flowers long-pedicellate, the pedicels more than twice as long as the calyx; leaves 1.5 cm. long or smaller_____7. **B. occidentalis.**
Flowers short-pedicellate, the pedicels usually less than twice as long as the calyx; leaves mostly larger.
Flowers nearly sessile in anthesis, the pedicels usually shorter than the calyx_____8. **B. retusa.**
Flowers pedicellate, the calyx usually equaling or longer than the calyx.
Leaves mostly 1.5 to 3 cm. long, pale beneath_____9. **B. brandegei.**
Leaves mostly 4 to 5.5 cm. long, not pale beneath.
10. B. socorrensis.
Leaves oblong to oval or elliptic, broadest at or below the middle, usually obtuse or rounded at base.
Petioles much longer than the pedicels, usually more than twice as long.
11. B. laetevirens.
Petioles equaling or usually shorter than the pedicels.
Pedicels densely ferruginous-sericeous_____12. **B. persimilis.**
Pedicels glabrous or nearly so_____13. **B. peninsularis.**

1. **Bumelia eriocarpa** Greenm. & Conz. Field Mus. Bot. **2**: 334. 1912.

Oaxaca; type from Cerro San Antonio, altitude 1,700 meters.

Leaves short-petiolate, oblong or lance-oblong, 5 to 10 cm. long, 2 to 3.5 cm. wide, obtuse or rounded at apex, acute at base, thick-coriaceous, tomentulose or glabrate above, densely tomentose beneath; pedicels much shorter than the petioles, tomentose; fruit globose-ellipsoid, about 2 cm. long; seed 1.6 cm. long.

2. **Bumelia lanuginosa** (Michx.) Pers. Syn. Pl. 1: 237. 1805.

Sideroxylon lanuginosum Michx. Fl. Bor. Amer. 1: 122. 1803.

Bumelia lanuginosa rigida A. Gray, Syn. Fl. **2**[1]: 68. 1878.

Bumelia rigida Small, Bull. N. Y. Bot. Gard. 1: 444. 1900.

Coahuila and Nuevo León. Southern United States.

Tree, sometimes 20 meters high, with a trunk 1 meter in diameter, but usually much smaller, the branchlets spinose; bark dark grayish brown, deeply fissured into scaly ridges; leaves short-petiolate, oblong, cuneate-obovate, or oblong-oblanceolate, 2.5 to 8 cm. long, obtuse, brown-tomentose beneath or finally glabrate; pedicels about as long as the petioles; sepals 3 mm. long; fruit oval or obovoid, black; wood hard, close-grained, brown or yellowish, its specific gravity about 0.65. "Coma" (Texas).

The tree is known in Texas as "shittimwood" and "chittimwood." The wood is sometimes used for cabinet work and tool handles. The flowers are white and very sweet-scented. From the bark there exude drops of a gum, which is often chewed by children, who call it "chicady," this, according to Mackensen,[1] being probably a corruption of "chicle." The gum is known also as "gum elastic." The fruit is edible but not very palatable.

3. **Bumelia subsessiliflora** Hemsl. Biol. Centr. Amer. Bot. **2**: 299. 1881.

Type from Guadalajara, Jalisco, altitude 900 meters.

Shrub, the branches armed with stout axillary spines 12 mm. long; leaves short-petiolate, oblong, 5 to 10 cm. long, 2 to 3 cm. wide, obtuse at each end, ferruginous-puberulent or glabrate, coriaceous, lustrous above; sepals ferruginous-hirsute .

The writer has seen no material of this species.

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[1] The trees and shrubs of San Antonio and vicinity. 1909.

4. **Bumelia altamiranoi** Rose & Standl., sp. nov.

Type collected near Cadeyreta, Querétaro (*Rose, Painter & Rose* 9725; U. S. Nat. Herb. no. 453214).

Large tree, the branches armed with stout spines 1 to 3 cm. long, densely tomentose; petioles 3 to 6 mm. long; leaf blades broadly ovate to elliptic or oblong-oval, 2 to 4.5 cm. long, 1.5 to 3 cm. wide, rounded to subacute at apex, broadly rounded at base, loosely tomentose when young, glabrate above in age, paler beneath; pedicels in fruit stout, 4 to 5 mm. long, densely whitish-tomentose; fruit subglobose, 1.5 to 2 cm. long. "Huicicialtemetl."

Collected also at the same locality by F. Altamirano (no. 1644). The fruit is edible and has a sweet and agreeable flavor.

5. **Bumelia stenosperma** Standl., sp. nov.

Type collected between Totolapa and San Carlos, Oaxaca, altitude 900 to 1,140 meters (*Nelson* 2548; U. S. Nat. Herb. no. 569206).

Branches armed with stout spines 7 to 15 mm. long, the young branchlets ferruginous-tomentose; petioles slender, 6 to 8 mm. long; leaf blades broadly elliptic, 1.5 to 3 cm. long, 1.2 to 1.8 cm. wide, rounded or emarginate at apex, obtuse at base, thinly tomentose above when young but soon glabrate and very lustrous, densely ferruginous-tomentose beneath; pedicels in fruit very stout, about 5 mm. long; fruit oblong-ellipsoid, 1.5 to 2 cm. long; seed oblong, 1.5 cm. long, 6 mm. thick, smooth, brownish gray, mottled with small, pale brown spots.

6. **Bumelia spiniflora** A. DC. in DC. Prodr. 8: 191. 1844.

?*Bumelia ferox* Schlecht. & Cham. Linnaea 6: 392. 1831.

?*Bumelia spinosa* A. DC. in DC. Prodr. 8: 191. 1844.

Bumelia angustifolia Nutt. N. Amer. Sylv. 3: 38. *pl. 93.* 1849.

Bumelia schottii Britton, N. Amer. Trees 777. 1908.

Tamaulipas and Nuevo León; Sinaloa; Veracruz (?). Florida and Texas; Bahamas; El Salvador.

Shrub or small tree, 2 to 6 meters high, the trunk sometimes 20 cm. in diameter, the bark reddish gray, deeply fissured; branchlets spinose, sericeous when young or glabrous; leaves short-petiolate, cuneate-oblanceolate to rounded-obovate, rounded at apex, coriaceous, subpersistent, glabrous; flowers short-pedicellate; sepals 2 to 2.5 mm. long; fruit oblong or oval, 1 to 2 cm. long, black, the flesh sweet and edible; wood hard, weak, light brown, its specific gravity about 0.79. "Coma resinera" (Tamaulipas); "coma" (Texas, Tamaulipas).

Known in Florida and the Bahamas as "saffron plum," "ant's-wood," and "downward plum." The Mexican plant has been referred to *B. cuneata* Swartz, a West Indian species. Endlich reports that in Tamaulipas the fruit is eaten as an aphrodisiac.

7. **Bumelia occidentalis** Hemsl. Biol. Centr. Amer. Bot. 2: 298. 1881.

Sonora and southern Baja California; type from Sonora.

Shrub, the branchlets sometimes spinose; leaves short-petiolate, obovate or cuneate, 6 to 15 mm. long, rounded at apex, grayish-sericeous or in age glabrate; pedicels 5 to 18 mm. long, usually longer than the leaves; sepals 3 mm. long, tomentulose. "Bebelama" (Sonora).

8. **Bumelia retusa** Swartz, Prodr. Veg. Ind. Occ. 49. 1788.

Yucatán. Jamaica (type locality).

Shrub or small tree, 3 to 4.5 meters high; leaves short-petiolate, broadly obovate or rounded-obovate, 2.5 to 4.5 cm. wide, rounded or emarginate at apex, broadly cuneate or sometimes rounded at base, coriaceous, brown-sericeous

beneath or glabrate; flowers numerous, in dense fascicles, greenish yellow; fruit subglobose, 8 to 10 mm. long. "Putzmucuy" (Yucatán, Maya).

The Yucatán material has been referred to *B. buxifolia* Willd., *B. glomerata* Griseb., and *B. microphylla* Griseb., but it is probable that all the collections are referable to *B. retusa*, to which some of them have been referred by Pierre and Urban.

9. **Bumelia brandegei** Blake, Contr. Gray Herb. **52**: 76. 1907.

Bumelia fragrans T. S. Brandeg. Zoe **5**: 106. 1901. Not *B. fragrans* Ridley, 1890.

Southern Baja California; type from San José del Cabo.

Shrub, 3 to 5 meters high, the branches armed with short spines; leaves short-petiolate, cuneate-obovate to suborbicular, rounded or retuse at apex, thick, glabrous or nearly so; flowers white, very fragrant, in dense fascicles, the pedicels 6 to 10 mm. long.

10. **Bumelia socorrensis** T. S. Brandeg. Zoe **5**: 106. 1901.

Socorro Island.

Spiny shrub; leaves oblong-obovate, rounded at apex, cuneate at base, sparsely brown-sericeous when young but soon glabrate, thin; flowers few, the pedicels 3 to 4 mm. long; fruit ellipsoid, 12 to 14 mm. long, 8 mm. thick.

11. **Bumelia laetevirens** Hemsl. Biol. Centr. Amer. Bot. **2**: 298. 1881.

Bumelia mexicana Engl. Bot. Jahrb. Engler **12**: 519. 1890.

Achras olivacea Sessé & Moc. Fl. Mex. 91. 1894.

Bumelia palmeri Rose, Gard. & For. **7**: 195. *f. 35*. 1894.

Bumelia arborescens Rose, Contr. U. S. Nat. Herb. **1**: 339. 1895.

Sinaloa to Tamaulipas, Veracruz, Puebla, and Oaxaca; type from Cordillera of Oaxaca.

Tree, sometimes 16 meters high, with broad spreading dense crown, the bark thick, dark, irregularly furrowed; branchlets often spinose; leaves slender-petiolate, oblong to elliptic or broadly ovate, 5 to 10.5 cm. long, 2.5 to 5.5 cm. wide, rounded to subacute at apex, obtuse or acute at base, bright green, glabrous and lustrous above, paler beneath, and when young densely sericeous; flowers white, sweet-scented, in dense fascicles; fruit globose or oval, 1 to 1.5 cm. long, depressed at apex, black; seeds rounded, 8 to 10 mm. long, brown, very lustrous. "Coma" (Tamaulipas); "tempixtle" (Oaxaca, Veracruz, Jalisco); "tempixquiztli," "tempesquistle," "tempizquixtli," "tempizquiztle" (Oaxaca, Veracruz, Puebla, Jalisco); "tempixle" (Oaxaca, *Reko*); "tilapo" (Oaxaca, Veracruz, Jalisco); "cupia," "bebelama" (Sinaloa); "tempeschitle," "tilzapotl," "tempextle" (*Sessé & Mociño*).

The fruit is said to yield a kind of "chicle." It is eaten either fresh or dried, and is often seen in the markets. The immature fruits are pickled in vinegar and salt, like olives. The ripe fruit is sweet and mucilaginous.

The tree is described by Hernández under the name "tempixquiztli." He states that a decoction of the leaves was dropped into the ears and nostrils to allay pain, and that the leaves were heated and applied to the teeth for the same purpose, as well as to harden the gums.

12. **Bumelia persimilis** Hemsl. Biol. Centr. Amer. Bot. **2**: 298. 1881.

Veracruz; type from region of Orizaba.

Tree; leaves short-petiolate, elliptic-oblong, 5 to 9 cm. long, obtuse at base and apex, bright green and glabrous above, brown-sericeous beneath when young; flowers in dense fascicles, the pedicels 6 to 10 mm. long.

13. **Bumelia peninsularis** T. S. Brandeg. Zoe 5: 107. 1901.

Southern Baja California, the type from mountains of the Cape Region; Sinaloa; San Luis Potosí.

Shrub, 3 to 4 meters high, the branches armed with spines; leaves short-petiolate, oblong to elliptic-oval, 2 to 4.5 cm. long, rounded at apex, obtuse or rounded at base, ferruginous-sericeous when young but soon glabrate; fascicles few-flowered; fruit ellipsoid, about 1.5 cm. long.

4. ACHRAS L. Sp. Pl. 1190. 1753.

The genus consists of a single species.

1. **Achras zapota** L. Sp. Pl. 1190. 1753.

Achras sapota L. Sp. Pl. ed. 2. 470. 1762.

Achras zapota zapotilla Jacq. Stirp. Amer. 57. 1763.

Sapota achras Mill. Gard. Dict. ed. 8. *Sapota* no. 1. 1768.

Sapota zapotilla Coville, Contr. U. S. Nat. Herb. 9: 369. 1905.

Sonora to Chiapas, Tabasco, Yucatán, and Veracruz; indigenous in Chiapas, Oaxaca, Tabasco, and Yucatán, but elsewhere perhaps only cultivated or adventive. West Indies, Central America, and northern South America, but doubtfully indigenous.

Large tree, sometimes 20 meters high or more, the crown dense, rounded or elongate; bark brownish, furrowed; leaves petiolate, clustered at the ends of the stout branchlets, elliptic-oblong or elliptic, 5 to 14 cm. long, obtuse, acute or obtuse at base, glabrous when mature, the lateral nerves numerous and parallel but scarcely visible; flowers solitary in the axils, the pedicels 1 to 1.5 cm. long; sepals usually 6, ovate, 9 mm. long; corolla white, 1 cm. long, glabrous; staminodia petal-like; fruit ovoid or globose, 6 cm. long or larger, the skin thin, brown, scaly or smooth; seeds 1 to 5, sometimes 10 or 12, brown or black, smooth and shining, 2 to 2.5 cm. long. "Zapote" (Yucatán, etc., Cuba); "chicozapote" (Veracruz, Oaxaca, Jalisco, Guerrero, etc.; from the Nahuatl *tzicozapotl*, "gum-zapote"; also written *chiczapotl* and *xicozapotl*); "sheink" (Mixe, *Belmar*); "zapote chico" (various localities); "chicle" (the gum); "palo María" (Yucatán, Chiapas, *Ramirez*); "ya" (Yucatán, Maya); "zapotillo" (Morelos, Veracruz, *Ramírez*); "peruétano" (Yucatán, Colima, *Urbina*); "zapote de abejas" (Yucatán, Colima, *Urbina*); "guenda-xiña" (Oaxaca, Zapotec, *Reko*); "chico" (Philippines); "níspero" (Central America, Porto Rico, Cuba, Venezuela, Colombia); "muyozapot" (El Salvador); "mamey" (Panama).

The sapodilla or naseberry is one of the best-known tropical American trees. The fruit is highly esteemed by many persons. It is variable in form, but usually 5 to 9 cm. in diameter; the flesh is yellowish brown, translucent, soft, sweet, and delicious when fully ripe, but when green it contains tannin and a milky latex.

The most important product of the tree is "chicle" gum, which is employed in the manufacture of chewing gum. This is obtained by tapping the trees, or by pressing the fruit. That obtained by tapping is known as "chicle corriente," and that from the fruit as "chicle blanco" or "chicle virgen." The sap obtained by tapping is boiled after having been collected, and as a result the gum coagulates and is separated. Large mounts of the gum are exported from Chiapas, Tabasco, and Yucatán. The Aztecs were well acquainted with its extraction; the women and children chewed it, and figures were sometimes modeled from it.

The wood is fine, hard, and reddish. It is used for making carts and other articles. The bark is said to contain an alkaloid, sapotine, and is employed locally as a remedy for fevers. Diuretic properties are attributed to the seeds.

Achras cosagüico Llave,[1] described from Veracruz, is probably a synonym. It was described as having yellow fruit, and the vernacular name was given as "cosagüico," which, according to Urbina, should probably be "cozahuico."

The tree is described by Hernández under the name "xicozapotl." For illustrations see Contr. U. S. Nat. Herb. 18: *pl. 46, 47.*

5. CALOCARPUM Pierre in Urban, Symb. Antill. 5: 97. 1904.

Only one other species is known, a native of Central America.

1. **Calocarpum mammosum** (L.) Pierre in Urban, Symb. Antill. 5: 98. 1904.

Sideroxylum sapota Jacq. Enum. Pl. Carib. 15. 1760.

Achras mammosa L. Sp. Pl. ed. 2. 469. 1762.

Lucuma mammosa Gaertn. f. Fruct. & Sem. 3: 129. *pl. 203.* 1805.

Vitellaria mammosa Radlk. Sitzungsb. Math. Phys. Akad. Wiss. München 12: 296. 1882.

Achradelpha mammosa Cook, Journ. Washington Acad. Sci. 3: 160. 1913.

Widely cultivated in the warmer parts of Mexico, as far north as Sinaloa; perhaps native in southern Mexico. Widely distributed in tropical America, at least in cultivation.

Tree, 10 to 30 meters high, with milky juice, the crown rounded or depressed; bark reddish brown, shaggy; leaves deciduous, petiolate, obovate, 10 to 30 cm. long, rounded to acute at apex, attenuate at base, pubescent beneath when young but soon glabrate, the lateral nerves distant, parallel; flowers glomerate, subsessile, on defoliate branches; sepals 8 to 10, 2.5 to 6 mm. long, sericeous; corolla white, 9 to 10 mm. long, 5-lobate; fruit globose or ovoid, 8 to 20 cm. long, pointed at apex, the skin brown, scaly, the flesh pink or reddish; seed 1, about 8 cm. long, smooth and lustrous except for the large ventral area. "Zapote" (various localities, also Central America, Colombia, Ecuador, from the Nahuatl, *tzapotl*); "atzapotlquahuitl" (Nahuatl, *Ramírez*); "zapote colorado" (Tabasco, *Ramírez*); "tezonzapote" (southern Mexico, from the Nahuatl, *tezontzapotl;* "lava-zapote," from the rough brown skin, which resembles *tezontle*, a kind of volcanic rock); "mamey colorado" (Oaxaca, Yucatán, Cuba, Venezuela, Colombia, Ecuador); "mamey" (Guerrero, Morelos, Cuba); "zapote mamey" (Morelos, Yucatán, Oaxaca, Guerrero); "haaz," "chacal haaz" (Yucatán, Maya; according to Seler, *haaz* is now the Maya word for banana, but this is a recent application; the sapote is now called *chacal haaz,* "*red haaz,*" to distinguish it from the banana); "potkak" (fruit), "kaukpahk" (seed) (Mixe, *Belmar*); "mamey zapote" (Porto Rico); "tsapas sabani" (Zoque).

The sapote (known also as "mamee sapote" and "marmalade-fruit") is a common fruit tree of tropical America. By many persons the fruit is highly esteemed, but it is rarely liked by those who have not been accustomed to it. The flesh is sweetish, with peculiar flavor, and is often made into marmalade or jelly.

The handsome seeds, known in Mexico as "pizle" or "pixtle," and in Central America as "sapuyul" or "zapoyol," are still used in Central America and southern Mexico, mixed with cacao and parched corn, for the preparation

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[1] Registro Trimestre, Mexico, Febr. 6, 1832.

of a beverage, which is called "choue" by some of the Mexican Indians. The sapote seeds are used because of their flavor, which resembles that of bitter almonds. In Costa Rica they were formerly employed in place of an iron for smoothing starched linen. In the same country, as well as in Mexico, the kernels are ground and made into sweetmeats.

The wood is said to be fine-grained, hard, and compact, with a specific gravity of about 0.58. It is suitable for cabinet work but is little used, since the trees are protected for their fruit.

There is a popular belief in Mexico that the oil of the seeds will restore fallen hair. According to Altamirano[1] and others this results from the fact that the Aztecs employed it for dressing the hair, to keep it soft and to prevent dandruff. The seed coat was used by the Aztecs as a remedy for epilepsy, and in Costa Rica it is considered a cure for colds. The sap of the tree is said to have vomitive and anthelmintic properties and the seeds to be diuretic.

The tree is described by Hernández under the name "tezontzapotl." He states that the oil of the seeds was applied to painted *jícaras* (cups made from gourds) and to other similar objects to fix their colors. The pulverized seed coat, drunk in wine, is said to cure the gravel and heart affections.

DOUBTFUL SPECIES.

CALOCARPUM PARVUM Pierre, Notes Bot. Sapot. 13. 1890. Briefly described from Mexico. The vernacular name is given as "zapote niño."

6. LUCUMA Molina, Sagg. Stor. Nat. Chil. 186. 1782.

Shrubs or trees, with milky juice; leaves petiolate; flowers pedicellate, solitary or fasciculate in the axils; sepals 4 to 6; corolla urceolate or campanulate, 4 or 5-lobate; stamens 4 or 5, alternating with small, linear or scalelike staminodia; seeds 1 to 5.

Sepals 6 ..... 1. L. salicifolia.
Sepals 4 or 5.
  Sepals 4 ..... 2. L. sphaerocarpa.
  Sepals 5.
    Leaves subacuminate, 20 to 23 cm. long ..... 3. L. campechiana.
    Leaves mostly obtuse, 6 to 16 cm. long ..... 4. L. palmeri.

1. **Lucuma salicifolia** H. B. K Nov. Gen. & Sp. **3**: 241. 1819.
Vitellaria salicifolia Engl. Bot. Jahrb. Engl. **12**: 514. 1890.
Sideroxylon campestre T. S. Brandeg. Univ. Calif. Publ. Bot. **7**: 329. 1920.
Veracruz and Morelos, and probably elsewhere.

Small or large tree, the branchlets brownish-sericeous or glabrate; leaves slender-petiolate, lanceolate or narrowly lanceolate, 13 to 28 cm. long, 3 to 7.5 cm. wide, acute or acuminate, attenuate at base, lustrous, glabrous; sepals about 6 mm. long, sericeous; corolla yellowish green; fruit subglobose or ovoid, 7.5 to 12 cm. in diameter, orange-yellow when mature, the pulp reddish yellow; seeds 3 or 4, ellipsoid, dark brown, about 5 cm. long and 2.5 cm. thick. "Zapote amarillo," "zapote borracho," "cozticzapotl," "atzapotl," "atzapolquahuitl," "zapote de niño."

The fruit is edible and is found in the markets, but the tree is seldom cultivated. The fruit is said to produce drowsiness, hence its name of "zapote borracho." The bark is reputed to have antiperiodic properties.

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[1] Fernando Altamirano, El árbol de mamey, Naturaleza 3: 138–144. 1876.

The tree is described by Hernández, who says: "The Mexicans in their language, which is expressive, elegant, and precise, indicate in their names the properties as well as the uses of plants. In this way, they apply the name *tzapotl* [zapote] as a general term to all fruits which have a sweet flavor, and *xocotl* [jocote] to those which are sour. The *atzapotl* or 'water *tzapotl*' is so called because it comes from a tree which grows near the water. It is a large tree, with leaves like those of the orange, and bears near the ends of the branches white star-shaped flowers, which produce a fruit nearly round, large, yellow within, and of sweet flavor. This is in a way a disagreeable and indigestible food, and sometimes excites fever. Within the fruit is a stone which is used especially for ulcers."

2. **Lucuma sphaerocarpa** DC. Prodr. 8: 169. 1844.

Described from one of Sessé and Mociño's drawings of a Mexican plant; not known to the writer.

Petioles 6 to 8 mm. long; leaf blades oblong-obovate, 7.5 to 10 cm. long, 3.7 cm. wide, acute, acuminate at base; flowers pedicellate, in clusters of 3 or 4; corolla 6-lobate, greenish; fruit globose, 6 cm. in diameter, greenish, the flesh yellow; seeds 4, fuscous, ellipsoid, 3 cm. long.

The names "comíngalo" (Jalisco), "tempixque," and "tempixtle" (Tierra Caliente) are reported for this plant in Mexican literature, but there is no reason for believing that they apply to the plant originally described as *Lucuma sphaerocarpa.*

3. **Lucuma campechiana** H. B. K. Nov. Gen. & Sp. 3: 240. 1819.

Vitellaria campechiana Engl. Bot. Jahrb. Engl. 12: 513. 1890.

Type from Campeche. Reported from Honduras by Hemsley. Not known to the present writer.

Petioles about 2.5 cm. long; leaf blades oblong, 7 to 8 cm. wide, acute at base, glabrous, lustrous; pedicels ternate, half as long as the petiole; corolla 5-lobate, glabrous.

4. **Lucuma palmeri** Fernald, Proc. Amer. Acad. 33: 87. 1897.

Colima to Oaxaca; type from Acapulco. El Salvador.

Shrub, 1.5 to 3 meters high, the branchlets brown-sericeous; leaves petiolate, oblanceolate or oblong-obovate, 2.5 to 5.5 cm. wide, attenuate at base, ferruginous-pubescent beneath when young but soon glabrate; flowers solitary, geminate, or ternate, the pedicels 1 to 2 cm. long; sepals 5.5 mm. long, sericeous; corolla twice as long as the calyx, 5 or 7-lobate; fruit subglobose, 3 cm. long, yellow; seed 1, ellipsoid, 2.5 cm. long, stramineous, lustrous. "Huicón," "palo huicón"; "güicume" (El Salvador).

The fruit is edible, but of poor quality.

DOUBTFUL SPECIES.

LUCUMA MULTIFLORA DC. is said to be cultivated in Yucatán, where it is known as "kanizté" or "kanisté." The writer has seen no specimens from Yucatán. The species is a native of Porto Rico and the Lesser Antilles.

7. SIDEROXYLON L. Sp. Pl. 192. 1753.

Shrubs or trees; leaves usually long-petiolate; flowers small, white or greenish yellow, in dense, axillary or lateral fascicles; sepals usually 5, ovate or orbicular, obtuse, subequal; corola tubular-campanulate, usually 5-lobate; ovary usually 5-celled; fruit mostly 1-seeded.

Pedicels and petioles glabrous.
Sepals 1.5 mm. long----------1. S. gaumeri.
Sepals 3 mm. long----------2. S. tempisque.
Pedicels and petioles pubescent.
Leaves whitish, covered on both sides with a dense tomentum, small, mostly 1.5 to 2 cm. wide----------3. S. leucophyllum.
Leaves green, not tomentose, mostly 4 to 7 cm. wide.
Petioles elongate, usually half as long as the blades or longer.
4. S. capiri.
Petioles short, a fifth as long as the blades or shorter.
5. S. angustifolium.

1. **Sideroxylon gaumeri** Pittier, Contr. U. S. Nat. Herb. 13: 460. *f. 86.* 1912.
Yucatán; type from Izamal.

Tree, 30 meters high or less, glabrous throughout; leaves long-petiolate, oblong or oval-oblong, 8 to 14 cm. long, obtuse, rounded or obtuse at base, coriaceous, lustrous; flowers in dense fascicles on old wood, the pedicels 4 to 6 mm. long; fruit ellipsoid, 1-seeded, about 2 cm. long.

This has been reported from Yucatán as *S. mastichodendron* Jacq., a West Indian species, to which it is closely related.

2. **Sideroxylon tempisque** Pittier, Contr. U. S. Nat. Herb. 13: 461. *f. 87, 88.* 1912.
Chiapas. Central America; type from Laguna de Santa Tecla, El Salvador.

Large tree, glabrous throughout; leaves long-petiolate, oval or elliptic-oblong, 7 to 12 cm. long, obtuse or subacute, obtuse or rounded at base, coriaceous; pedicels 5 to 6 mm. long, densely clustered on old wood; corolla 7 to 8 mm. long; fruit ovoid or ellipsoid, 3 to 4 cm. long, 1-seeded. "Tempisque" (Guatemala, El Salvador); "saquaia" (El Salvador).

3. **Sideroxylon leucophyllum** S. Wats. Proc. Amer. Acad. 24: 59. 1889.
Southern Baja California; type from Los Angeles Bay.

Shrub or small tree, 1.5 to 2.5 meters high, the trunk sometimes 30 cm. in diameter; leaves oblong or narrowly oblong, 4 to 7 cm. long, obtuse, short-petiolate; flowers densely clustered in the leaf axils; sepals 4 mm. long, densely white-tomentose; corolla greenish yellow, 5 mm. long.

The fruit is not known, and the generic position of the plant is uncertain.

4. **Sideroxylon capiri** (A. DC.) Pittier, Contr. U. S. Nat. Herb. 13: 462. 1912.
Lucuma capiri A. DC. in DC. Prodr. 8: 173. 1844.
Sideroxylon mexicanum Hemsl. Biol. Centr. Amer. Bot. 2: 296. 1881.
Sideroxylon petiolare A. Gray, Proc. Amer. Acad. 22: 434. 1887.
Achras capiri Sessé & Moc. Pl. Nov. Hisp. ed. 2. 48. 1893.
Sinaloa and Jalisco to Guerrero; type (according to Sessé and Mociño) from Michoacán.

Large tree, the bark reddish brown or brownish yellow, the branchlets tomentulose; petioles often as long as the blades; leaf blades ovate to oval or oblong, 7 to 16 cm. long, acute to rounded at apex, rounded or obtuse at base, brownish-pubescent when young, in age glabrate; pedicels 10 to 12 mm. long, clustered on defoliate branches; sepals about 4 mm. long; corolla pale yellow; fruit ovoid, globose, or ellipsoid, 3 to 3.5 cm. long, containing 1 or more seeds. "Capiri," "capire" (Michoacán, Guerrero); "tempixque," "tempisque" (Michoacán); "huacux" (Michoacán, Tarascan); "zapote de ave" (Michoacán, Guerrero, *Urbina*); "tototzapotl" (Nahuatl); "cosahuico" (*Conzatti*).

The fruit is sweet and is eaten either raw or cooked. Birds are said to be fond of it.

5. Sideroxylon angustifolium Standl., sp. nov.

Sonora and Sinaloa; type from La Peonia, Sinaloa, altitude 610 meters (*Montes & Salazar* 884; U. S. Nat. Herb. no. 1035645).

Tree, 15 to 18 meters high, the trunk 40 to 60 cm. in diameter; leaves oblong or oblong-oblanceolate, 13 to 18 cm. long, 4 to 6 cm. wide, acute or obtuse, acute or subobtuse at base, brownish-pubescent on both surfaces or finally glabrate above; petioles 2 to 2.5 cm. long; flowers fasciculate on old wood, the pedicels 7 to 9 mm. long, pubescent; sepals 3 mm. long, brown-sericeous; ovary 5-lobate, glabrous. "Tempisque," "tempixtle" (Sinaloa).

The bark is used in Sinaloa for curdling milk.

One collection from Oaxaca (*Nelson* 2345) probably represents the same species, although in this the leaves are rounded or very obtuse at apex. The fruit is subglobose, 1-seeded, and about 2.5 cm. long.

135. DIOSPYRACEAE. Persimmon Family.

REFERENCE: Hiern, A monograph of Ebenaceae, Trans. Cambridge Phil. Soc. 12: 27–300. 1873.

Shrubs or trees; leaves alternate, entire, deciduous or persistent, estipulate; flowers small, white or green, solitary or cymose, axillary, unisexual; calyx inferior, the segments connate, persistent and accrescent in fruit; corolla urceolate, campanulate, or salverform; stamens 3 to many, inserted at the base of the corolla; ovary 2 to 16-celled, the ovules usually solitary; fruit baccate, large, containing several large seeds.

Flowers 3-parted ..... **1. MABA.**
Flowers 4 to 6-parted ..... **2. DIOSPYROS.**

1. MABA Forst. Char. Gen. 121. 1776.

Shrubs or trees; flowers dioecious, 3-parted, solitary or in small cymes, axillary; calyx 3-lobate, accrescent; corolla tubular or campanulate; stamens 3 to many in the staminate flower, usually about 9, glabrous; ovary 3 or 6-celled, usually hairy; fruit globose or ovoid, 1 to 6-celled, containing 1 to 6 seeds.

Leaves densely and softly grayish-pubescent beneath ..... **1. M. albens.**
Leaves glabrate beneath, or the pubescence sparse or, if dense, brownish.
  Leaves acute or acuminate.
    Leaves hirtellous; fruiting calyx deeply lobate ..... **2. M. acapulcensis.**
    Leaves sparsely appressed-pilosulous or glabrate; fruiting calyx shallowly lobate ..... **3. M. verae-crucis.**
  Leaves rounded or very obtuse at apex.
    Leaves 5.5 to 6 cm. wide, oblong-oval ..... **4. M. rekoi.**
    Leaves 3 cm. wide or narrower.
      Leaves oblong-oblanceolate, 5.5 to 8 cm. long, glabrate. **5. M. salicifolia.**
      Leaves oblong to obovate or elliptic, usually less than 6 cm. long, densely pubescent beneath, at least when young.
        Leaves hirtellous beneath, mostly 3 to 6 cm. long ..... **6. M. latifolia.**
        Leaves appressed-pilosulous beneath, mostly 1 to 2 cm. long. **7. M. intricata.**

1. Maba albens (Presl) Hiern, Trans. Cambridge Phil. Soc. 12: 126. 1873.

Diospyros albens Presl, Rel. Haenk. 2: 62. 1836.

Guerrero and Oaxaca; type from Acapulco, Guerrero.

Leaves short-petiolate, oblong-obovate or oblong, 3 to 7 cm. long, obtuse or rounded at apex, acute at base, densely pubescent on both surfaces; staminate

calyx about 6 mm. long, densely pubescent; corolla pubescent outside, glabrous within. "Coacolutillo" (*Conzatti*).

2. **Maba acapulcensis** (H. B. K.) Hiern, Trans. Cambridge Phil. Soc. **12**: 128. 1873.

Diospyros acapulcensis H. B. K. Nov. Gen. & Sp. **3**: 254. 1819.

Type from Acapulco, Guerrero.

Leaves obovate-lanceolate, about 6.5 cm. long and 2 cm. wide, acute, cuneate at base, membranous; fruit subsessile, subglobose, 2.5 cm. in diameter, the calyx nearly 2.5 cm. broad.

3. **Maba verae-crucis** Standl. Contr. U. S. Nat. Herb. **18**: 119. 1916.

Veracruz and Oaxaca; type from Catemaco, Veracruz, altitude 300 meters. El Salvador.

Leaves short-petiolate, elliptic-obovate or oblanceolate-oblong, 5.5 to 8.5 cm. long, 1.8 to 4 cm. wide, attenuate at base, glabrate in age; calyx 6 mm. long, densely pubescent; fruit 1.2 to 1.6 cm. in diameter, 6-seeded. "Pipinance" (El Salvador).

4. **Maba rekoi** Standl. Contr. U. S. Nat. Herb. **20**: 193. 1919.

Type from Puerto Angel, Oaxaca.

Leaves short-petiolate, 10 to 11 cm. long, rounded at base, minutely pilose or glabrate; fruit globose, 1.5 to 2 cm. in diameter, the calyx 1.5 to 2 cm. broad, densely puberulent. "Zapote enano."

5. **Maba salicifolia** (Humb. & Bonpl.) Hiern, Trans. Cambridge Phil. Soc. **12**: 129. 1873.

Diospyros salicifolia Humb. & Bonpl.; Willd. Sp. Pl. **4**: 1112. 1805.

Specimens from Acapulco, Guerrero, are probably referable here; the species was described from tropical America.

Shrub, 2 to 3 meters high; leaves short-petiolate, 1 to 2 cm. wide, coriaceous, lustrous above, narrowed to the base; fruit about 2.5 cm. in diameter, greenish yellow. "Coacollatillo" (*Palmer*); "ébano" (Guerrero).

The fruit is edible, as in other species of the genus.

6. **Maba latifolia** Standl. Contr. U. S. Nat. Herb. **18**: 118. 1916.

Sinaloa; type from Guadalupe.

Shrub or tree, 1 to 9 meters high; leaves oblong to oval-obovate, 1.5 to 3 cm. wide, rounded at apex, obtuse at base, coriaceous, grayish green; fruit about 2.5 cm. in diameter, yellowish, with reddish pulp; seeds 6, 11 mm. long. "Estrellito."

7. **Maba intricata** (A. Gray) Hiern, Trans. Cambridge Phil. Soc. **12**: 126. 1873.

Macreightia intricata A. Gray, Proc. Amer. Acad. **5**: 163. 1862.

Southern Baja California; type from Cape San Lucas.

Leaves oblong-obovate or oblong, 5 to 8 mm. wide, rounded at apex, obtuse or cuneate at base, coriaceous, grayish green; fruit orange, 1.5 to 2 cm. in diameter, 6-seeded. "Zapotillo."

This was reported by Goldman[1] as *Brayodendron texanum*.

EXCLUDED SPECIES.

MABA PAVONII (A. DC.) Hiern, Trans. Cambridge Phil. Soc. **12**: 129. 1873. *Diospyros pavonii* A. DC. in DC. Prodr. **8**: 222. 1844. Described as a native of

[1] Contr. U. S. Nat. Herb. **16**: 359. 1916.

either Mexico or Peru, but no similar plant has been found recently in Mexico. The vernacular name is given as "orlaca," which does not suggest a Mexican name.

2. DIOSPYROS L. Sp. Pl. 1057. 1753.

Shrubs or trees; leaves persistent or deciduous; flowers dioecious, rarely polygamous, axillary, cymose or fasciculate; calyx 4 or 5-lobate; corolla urceolate, campanulate, or salverform, the lobes obtuse, spreading or recurved; fruit baccate, containing 1 to 10 seeds.

The genus is a large one, containing 150 or more species, most of which are natives of the Old World. Some of them furnish the ebony of commerce. *Diospyros kaki* L. is the Japanese persimmon, which is widely grown for its large handsome sweet fruit. *Diospyros virginiana* L. is the common persimmon of the eastern and southern United States. Its fruit is extremely astringent when green, but in fall, especially after frost, it becomes soft and sweet. It is a favorite wild fruit in the regions where it grows, and has been used in the preparation of a kind of beer, as well as distilled liquors. In the Southern States the seeds have been roasted and ground and used as a coffee substitute. The green fruit contains tannic acid, and has been employed as a domestic remedy for diarrhoea, chronic dysentery, and uterine hemorrhage. The bark is astringent and very bitter.

The following names are reported for unplaced Mexican species of *Diospyros;* they probably relate to *D. ebenaster:* "Hinchuik," "huinchuik" (Mixe, *Belmar*); "bomuttza" (Otomí, *Buelna*).

Ovary and fruit glabrous.
- Leaves densely pubescent ..... **1. D. oaxacana.**
- Leaves glabrous or nearly so.
  - Leaves acute or acuminate.
    - Leaves ciliate ..... **2. D. blepharophylla.**
    - Leaves not ciliate ..... **3. D. conzattii.**
  - Leaves rounded or retuse at apex.
    - Flowers 5-parted ..... **4. D. palmeri.**
    - Flowers 4-parted ..... **5. D. anisandra.**

Ovary and fruit pubescent.
- Leaves densely hirtellous beneath ..... **6. D. texana.**
- Leaves glabrous beneath, or when young with sparse appressed hairs.
  - Fruit 4 to 7 cm. in diameter; leaves mostly 9 to 17 cm. long. **7. D. ebenaster.**
  - Fruit 3 cm. or less in diameter; leaves usually smaller.
    - Calyx lobes broadest toward the apex, obtuse; leaves nearly sessile. **8. D. sonorae.**
    - Calyx lobes broadest at the apex, acutish or acute; leaves usually conspicuously petiolate.
      - Leaves rounded at base; petioles 2 to 4 mm. long ..... **9. D. sinaloensis.**
      - Leaves obtuse or cuneate at base; petioles 6 to 7 mm. long.
        - Calyx densely puberulent ..... **10. D. rosei.**
        - Calyx nearly glabrous ..... **11. D. sphaerantha.**

1. **Diospyros oaxacana** Standl. Contr. U. S. Nat. Herb. 20: 194. 1919.

Type from Cuicatlán, Oaxaca, altitude 600 meters.

Leaves nearly sessile, obovate-oblong or elliptic-oblong, 4 to 7.5 cm. long, obtuse or rounded at apex and base; fruit pedicellate, 1.5 cm. or more in diameter, the calyx lobes oblong, obtuse.

2. Diospyros blepharophylla Standl. Contr. U. S. Nat. Herb. **18**: 119. 1916.

Diospyros ciliata A. DC. in DC. Prodr. **8**: 229. 1844. Not *D. ciliata* Raf. 1836.

The type is said to have come from southern Mexico.

Petioles 1 cm. long; leaves ovate-elliptic, 4 to 7 cm. long, obtuse at base, membranaceous; flowers 4-parted.

3. Diospyros conzattii Standl. Journ. Washington Acad. Sci. **12**: 399. 1922.

Type from Cafetal San Rafael, Cerro Espino, Distrito de Pochutla, Oaxaca, altitude 1,000 meters.

Tree, 10 meters high; leaves short-petiolate, ovate-oblong or lance-oblong, 5 to 9.5 cm. long, acuminate; calyx lobes linear-lanceolate, 15 to 18 mm. long, long-attenuate; fruit depressed-globose, about 4 cm. in diameter, green, the flesh black; seeds 5 to 10. "Zapote negro montés."

The fruit is said to be of excellent flavor, and Professor Conzatti states that it is superior to any of the native Mexican fruits, with the possible exception of the chicozapote.

4. Diospyros palmeri Eastw. Proc. Amer. Acad. **44**: 604. 1909.

Tamaulipas and San Luis Potosí; type from San Dieguito, San Luis Potosí.

Shrub or small tree, 2.5 to 4.5 meters high, the trunk 10 to 15 cm. in diameter, the bark scaly; leaves oblong-obovate or elliptic-oblong, 2.5 to 5.5 cm. long; flowers 5-parted, glabrous; fruit black, 2.5 to 3 cm. in diameter. "Chapote," "zapote negro" (Tamaulipas).

5. Diospyros anisandra Blake, Proc. Biol. Soc. Washington **34**: 44. 1921.

Type from forests of Suitun, Yucatán.

Shrub, 3 meters high; leaves obovate, 2.5 to 4.5 cm. long, retuse at apex, shining above, glabrous except for a few hairs at base of blade on upper side; staminate corolla yellow, 14 mm. long, glabrous.

6. Diospyros texana Scheele, Linnaea **22**: 145 1849.

Brayodendron texanum Small, Bull. Torrey Club **28**: 356. 1901.

Coahuila, Nuevo León, and Tamaulipas. Western Texas.

Shrub or tree, sometimes 16 meters high, with a trunk 60 cm. in diameter; bark thin, smooth, light reddish gray, the outer layers peeling off; leaves nearly sessile, broadly obovate or oblong-obovate, 1 to 4 cm. long, rounded or emarginate at apex; corolla sericeous, 8 to 12 mm. long; fruit black, about 2 cm. in diameter, the pulp sweet, dark, containing 3 to 8 seeds; wood hard, compact, nearly black, its specific gravity about 0.85. "Chapote" (Tamaulipas, Texas); "chapote prieto" (Nuevo León).

The wood is susceptible of a high polish. It has been used for turning and for making tool handles, and in England it is said to have been used as a substitute for boxwood, in making engravings. The fruit is astringent when green but sweet when fully ripe. It leaves an indelible black stain upon everything with which it comes in contact, and is employed locally for dyeing sheep and goat skins.

Diospyros cuneifolia Hiern,[1] does not appear distinguishable from the description. It is said to come from Mexico. The writer has seen no material of *D. texana californica* T. S. Brandeg.,[2] which was described from Baja California. It may be a plant closely related to *D. texana*, but it seems more probable that it is a relative of *D. sonorae*, unless it should be found to be *Maba intricata*. Specimens of the last have been reported from Baja California as *Brayodendron texanum*.

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[1] Trans. Cambridge Phil. Soc. **12**: 268. 1873.

[2] Zoe **5**: 164. 1903.

7. **Diospyros ebenaster** Retz. Obs. Bot. 5: 31. 1789.

Diospyros obtusifolia Humb. & Bonpl.; Willd. Sp. Pl. 4: 1112. 1805.

Diospyros tiltzapotl Sessé & Moc. Pl. Nov. Hisp. 179. 1887.

Cultivated in Mexico from Jalisco to Chiapas, Veracruz, and Yucatán, and apparently naturalized locally. Native of the East Indies, but widely cultivated in tropical America.

Large shrub or medium-sized tree; leaves oblong or elliptic, sometimes 30 cm. long, persistent, obtuse or acutish, glabrous; flowers polygamous; corolla yellowish white or greenish; fruit subglobose, shining, olive-green, the pulp dark and soft; seeds 4 to 10. "Zapote prieto" (Jalisco, Chiapas, Michoacán, Guerrero, Morelos, Tabasco, Yucatán, Philippines); "tauch," "tauch ya" (Yucatán, Maya); "zapote negro" (Oaxaca); "biaqui" (Oaxaca, Zapotec, *Reko*); "tliltzapotl," "totocuitlatzapotl," "tlilzapotl" (Nahuatl); "guayabota" (Porto Rico).

This tree must have been introduced into Mexico at an early date, for it is mentioned by the older writers. Indeed, some writers have been inclined to consider it a native of Mexico, and Merrill states that it was carried from this country to the Philippines.

The tree is said to be the source of some of the East Indian ebony. The fruit is eaten, but is is of poor quality. The green fruit is reported to have been used in the Philippines and West Indies for stupefying fish. In Mexico the ripe fruit is made into preserves, which are reported to be of excellent quality. Brandy also is said to have been made from the pulp. Urbina reports the Otomí names as "bom-rza" and "phonimurza."

The tree was described by Hernández under the name "tlilzapotl" ("black zapote"). He states that it was used as a remedy for leprosy, ringworm, and itch, and also for killing fish.

8. **Diospyros sonorae** Standl. Contr. U. S. Nat. Herb. **18**: 120. 1916.

Sonora and Sinaloa; type from Alamos, Sonora.

Tree of large or medium size, the crown dense and spreading; leaves oblong or narrowly oblong, 6 to 13 cm. long, rounded at apex, grayish green, puberulent or glabrate beneath; fruit about 2.5 cm. in diameter; seeds about 8. "Guayaparín."

The tree is cultivated, but is probably also native in the region. The pulp of the fruit is black and insipid.

9. **Diospyros sinaloensis** Blake, Contr. Gray Herb. **52**: 77. 1917.

Sinaloa; type from Altata.

Leaves oblong, 5 to 12 cm. long, rounded at apex, grayish green, very sparsely appressed-pilosulous beneath when young but soon glabrous; corolla densely sericeous, about 1 cm. long.

10. **Diospyros rosei** Standl. Contr. U. S. Nat. Herb. **18**: 119. 1916.

Sinaloa (?) and Tepic; type from Acaponeta, Tepic.

Tree; leaves obovate-oblong, 6 to 14 cm. long, rounded at apex, cuneate at base, puberulent or glabrate beneath, coriaceous; fruit about 2.5 cm. in diameter; seeds 8 to 10. "Guayaparín" (Sinaloa).

11. **Diospyros sphaerantha** Standl. Contr. U. S. Nat. Herb. **18**: 191. 1916.

Type collected near Colomas, in the Sierra Madre of Sinaloa.

Leaves deciduous, elliptic-oblong, 4.5 to 8 cm. long, obtuse or rounded at apex, sparsely strigillose when young but soon glabrous; calyx 3 cm. broad; corolla 8 mm. long, densely sericeous.

It is rather doubtful whether this and *D. sinaloensis* are distinct from *D. rosei*.

DOUBTFUL SPECIES.

DIOSPYROS VELUTINA Hiern, Trans. Cambridge Phil. Soc. 12: 200. 1873. Based upon material from Brazil, but one Mexican specimen is reported.

136. STYRACACEAE. Storax Family.

REFERENCE: Perkins in Engl. Pflanzenreich IV. 241. 1907.

1. STYRAX L. Sp. Pl. 444. 1753.

Shrubs or small trees, with stellate pubescence; leaves alternate, estipulate, entire or remotely serrate; flowers perfect, white, in short, axillary or terminal, simple or branched racemes; calyx cupuliform, truncate or 5-denticulate; petals 5, short-connate; stamens 10, inserted at base of the corolla; style simple, the stigma capitate; fruit globose, dry or nearly so, 1-seeded, usually indehiscent.

Styrax benzoin Dryand., an Old World species, furnishes the resin known as benzoin, which is an official drug, and is employed also in perfumes and incense.

Corolla lobes imbricate; leaves less than twice as long as broad.
- Leaves densely stellate-pubescent on the upper surface----1. S. jaliscanus.
- Leaves glabrous on the upper surface or nearly so.
  - Leaves densely stellate-tomentulose beneath----2. S. pilosus.
  - Leaves glabrous beneath, sometimes barbate in the axils of the nerves. 3. S. glabrescens.

Corolla lobes valvate; leaves more than twice as long as broad.
- Leaves covered beneath with coarse spreading stellate hairs, the pubescence velutinous----4. S. argenteus.
- Leaves covered beneath with a minute, very close, stellate tomentum.
  - Flowers 1.5 cm. long----5. S. ramirezii.
  - Flowers about 1 cm. long.
    - Calyx about 2 mm. long----6. S. cyathocalyx.
    - Calyx about 4 mm. long----7. S. polyneurus.

1. Styrax jaliscanus S. Wats. Proc. Amer. Acad. 26: 144. 1891.

Styrax officinalis jaliscanus Perkins in Engl. Pflanzenreich IV. 241: 82. 1907.

Jalisco; type from Sierra de San Esteban.

Shrub, about a meter high; leaves subsessile, rounded-ovate to oblong-ovate, 4 to 10 cm. long, abruptly short-acuminate, entire, densely whitish-tomentose beneath; racemes 1 to 5-flowered, short; calyx evidently dentate; flowers 1.5 to 2 cm. long; fruit 8 to 12 mm. in diameter.

This is closely related to *S. officinalis* L., and perhaps not sufficiently distinct from that species of the Mediterranean region. The latter species yields a gum which was employed by the Egyptians as a perfume, and in recent times has been employed in medicine as "storax officinalis."

2. Styrax pilosus (Perkins) Standl.

Styrax glabrescens pilosus Perkins in Engl. Pflanzenreich IV. 241: 72. 1907.

Type from Chinantla and Rincón, Oaxaca, altitude 900 meters.

Leaves slender-petiolate, elliptic-oblong or elliptic, 6 to 10 cm. long, short-acuminate, glabrous above or when young with minute scattered stellate hairs, densely and minutely tomentulose beneath; flowers sweet-scented; calyx 4 mm. long, subentire, minutely grayish-tomentulose.

3. **Styrax glabrescens** Benth. Pl. Hartw. 66. 1839.

Veracruz, Hidalgo, Oaxaca, and Chiapas; type from Llano Verde, Oaxaca. Guatemala and Costa Rica.

Tree, 6 to 12 meters high; leaves slender-petiolate, elliptic-oblong to elliptic or ovate, 7 to 17 cm. long, abruptly short-acuminate, acute to rounded at base, thin, glabrous or nearly so; inflorescence lax, few-flowered, the flowers 1.5 to 3 cm. long; calyx 5 to 7 mm. long, stellate-pilose with rufous or yellowish hairs; fruit about 1 cm. in diameter. "Azahar del monte" (Veracruz); "bracino" (Costa Rica).

4. **Styrax argenteus** Presl, Rel. Haenk. **2**: 60. 1836.

Sinaloa to Chiapas; type from Acapulco. Central America.

Tree, 5 to 6 meters high, the trunk 30 cm. in diameter; leaves petiolate, oblong or lance-oblong, 7 to 14 cm. long, short-acuminate, rounded or obtuse at base, usually coriaceous; racemes axillary, few-flowered, the flowers 12 to 20 mm. long; calyx 4 to 5 mm. long, truncate; fruit 10 to 13 mm. in diameter. "Ruín" (Sinaloa); "capulín," "hoja de jabón" (Oaxaca); "chilacuate" (Michoacán, Guerrero); "resino," "resina" (Nicaragua, Costa Rica); "bracino" (Costa Rica); "estoraque" (Costa Rica, El Salvador); "estorac" (El Salvador); "sahumerio (Panama).

In Costa Rica and probably elsewhere the gum is burned as incense in the churches. It is said that the bark is employed in El Salvador for stupefying fish.

5. **Styrax ramirezii** Greenm. Proc. Amer. Acad. **34**: 20. 1899.

Styrax micranthus Perkins, Bot. Jahrb. Engler **31**: 480. 1902.

Styrax orizabensis Perkins, Repert. Sp. Nov. Fedde **2**: 25. 1906.

Michoacán, Morelos, Veracruz, and Oaxaca; type from Cuernavaca, Morelos.

Tree, 9 to 13 meters high; leaves petiolate, oblong or lance-oblong, 10 to 18 cm. long, acute or short-acuminate, obtuse or rounded at base, coriaceous, entire, glabrous above; calyx 4 to 6 mm. long, truncate; fruit 1 to 1.5 cm. long. "Chilacuate" (Morelos).

6. **Styrax cyathocalyx** Perkins, Repert. Sp. Nov. Fedde **2**: 24. 1906.

Type from Rincón, Oaxaca, altitude 900 to 1,200 meters.

Leaves petiolate, oblong or lance-oblong, 10 to 14 cm. long, long-acuminate, obtuse at base, coriaceous, glabrous and lustrous above; calyx truncate.

7. **Styrax polyneurus** Perkins, Bot. Gaz. **35**: 5. 1904.

Chiapas. Costa Rica, the type from Copey.

Tree; leaves petiolate, lanceolate or obovate-oblong, 8 to 12 cm. long, short-acuminate, cuneate at base, thin, entire, glabrate above; calyx truncate; fruit 7 mm. long.

A collection from San Luis Potosí (*Purpus* 5317), referred to *S. polyneurus* by Brandegee, probably represents an undescribed species, but the material is in fruit and furnishes no characters by which it may be segregated.

137. SYMPLOCACEAE. Sweetleaf Family.

REFERENCE: Brand in Engl. Pflanzenreich IV. **242**. 1901.

The family consists of a single genus.

1. SYMPLOCOS Jacq. Enum. Pl. Carib. 5. 1760.

Shrubs or trees; leaves alternate, sessile or petiolate, estipulate, entire or serrate, usually persistent; flowers small, perfect, mostly axillary, solitary, spicate, racemose, or fasciculate; sepals 5, connate, persistent; petals 3 to 11,

more or less connate; stamens 4 to many, inserted on the corolla; style simple, the stigma entire or lobulate; fruit baccate, globose or cylindric, 1 to 5-celled.

In South America the leaves of some species are used for making a tea, which is highly esteemed by the Indians as a tonic for the stomach. *S. tinctoria* (L. f.) L'Hér. is a native of the southern United States, where it is known as "sweetleaf." Its leaves have a sweet pleasant flavor, and are employed for dyeing yellow. The root has been used locally as a stomachic, and for syphilitic and scrofulous affections and kidney diseases.

Flowers solitary, or the inflorescences 2 or 3-flowered.....1. S. coccinea.
Flowers in several-flowered inflorescences.
  Branchlets brownish-tomentulose.
    Leaves entire or nearly so.....2. S. pycnantha.
    Leaves serrulate.....3. S. prionophylla.
  Branchlets glabrous or nearly so, the pubescence, if any, not brownish.
    Inflorescence sessile.
      Leaves glabrous.
        Calyx sericeous.....4. S. speciosa.
        Calyx glabrous.....5. S. apolis.
      Leaves pilose beneath, at least along the nerves.....6. S. jurgensenii.
    Inflorescence pedunculate.
      Leaves glabrous.....7. S. limoncillo.
      Leaves pilose beneath along the nerves.....8. S. citrea.

1. **Symplocos coccinea** Humb. & Bonpl. Pl. Aequin. 1: 185. *pl. 52*. 1808.
Alstonia ciliata Benth. Pl. Hartw. 48. 1840.
Symplocos ciliata Benth. Pl. Hartw. 78. 1841.
Hypopogon brevipes Turcz. Bull. Soc. Nat. Moscou 31[1]: 246. 1858.
Symplocos benthamii Gürke in Engl. & Prantl, Pflanzenfam. 4[1]: 172. 1890
Symplocos coccinea hirta Brand in Engl. Pflanzenreich IV. 242: 80. 1901.
Veracruz and Oaxaca; type from Jalapa, Veracruz.

Tree, the trunk 40 to 60 cm. in diameter, the branchlets hirsute or hirtellous; bark smooth, grayish; leaves short-petiolate, elliptic to oblong, acuminate, crenulate, glabrous or pilosulous beneath; flowers about 1.5 cm. long, red, 10-parted; calyx and corolla sericeous; fruit oblong or ellipsoid, about 2.5 cm. long, black, hirsute.

2. **Symplocos pycnantha** Hemsl. Biol. Centr. Amer. Bot. 2: 302. 1881.
Veracruz, Oaxaca, and Chiapas; type from Pueblo Nuevo, Chiapas.

Shrub or small tree; leaves obovate-oblong or oblong-oblanceolate, 6 to 12 cm. long-acuminate, cuneate at base, subcoriaceous, sparsely pilosulous beneath or glabrate; flowers pink, in sessile fascicles; corolla 5 or 6-parted 3 times as long as the calyx.

3. **Symplocos prionophylla** Hemsl. Biol. Centr. Amer. Bot. 2: 302. 1881.
Symplocos pringlei Robinson, Proc. Amer. Acad. 18: 168. 1891.
Michoacán, Morelos, Mexico, and Oaxaca; type from Oaxaca.

Tree, 6 to 9 meters high; leaves petiolate, elliptic or oblong-obovate, 6 to 12 cm. long, acute or short-acuminate, rounded or cuneate at base, appressed pilose beneath; flowers in sessile clusters; corolla 5 or 6-parted; fruit oblong, 1.5 cm. long or larger.

Brand lists *S. pringlei* as a distinct species, but states that it may be only a variety of *S. prionophylla*. The characters by which he separates the two in his key do not hold for the specimens examined.

4. Symplocos speciosa Hemsl. Biol. Centr. Amer. Bot. 2: 302. 1881.

Type from the mountains of Oaxaca, altitude 1,800 to 2,100 meters. Guatemala.

Tree; leaves petiolate, lanceolate to elliptic, 5 to 12 cm. long, acuminate, cuneate at base, entire, glabrous above, pilosulous beneath along the costa; corolla pink, glabrous or nearly so.

5. Symplocos apolis Brand, Ann. Cons. Jard. Bot. Genève 15–16: 343. 1913.

Type probably from Mexico, but perhaps from Peru.

Leaves broadly obovate, 8 to 11 cm. long, rounded or short-apiculate at apex, entire, glabrous; calyx lobes ciliate; corolla 6-lobate.

6. Symplocos jurgensenii Hemsl. Biol. Centr. Amer. Bot. 2: 301. 1881.

Oaxaca; type from Sierra San Pedro Nolasco.

Leaves lance-oblong or elliptic-oblong, 6 to 9 cm. long, obtusely short-acuminate, acute at base, crenulate; corolla 5-parted, glabrous; ovary 5-celled.

7. Symplocos limoncillo Humb. & Bonpl. Pl. Aequin. 1: 196. 1808.

Veracruz and Oaxaca; type from Jalapa, Veracruz. El Salvador.

Tree, nearly glabrous throughout; leaves petiolate, oblong to elliptic, 8 to 14 cm. long, acute or short-acuminate, entire or serrate, lustrous; flowers pink or white, about 1 cm. long; fruit about 18 mm. long, glabrous. "Garrapata," "garrapatilla," "limoncillo" (Veracruz); "chillador" (El Salvador).

Specimens of this species were referred by Hemsley to *S. martinicensis* Jacq., a West Indian species.

8. Symplocos citrea Lex.; Llave & Lex. Nov. Veg. Descr. 1: 22. 1824.

Oaxaca and perhaps elsewhere; type from Chaqueo.

Leaves oval, 9 to 11 cm. long, serrulate; flowers sweet-scented; calyx sericeous; corolla 6-lobate.

DOUBTFUL SPECIES.

SYMPLOCOS SCHIEDEANA Schlecht. Linnaea 8: 527. 1833. Type collected between Tioselo and Jicochimalco. Brand states that the type is without flowers and fruit, and probably does not belong to this genus.

138. OLEACEAE. Olive Family.

Shrubs or trees, rarely herbs, unarmed; leaves all or mostly opposite, simple or pinnate, estipulate; flowers perfect or unisexual, regular, variously arranged; calyx free, small, 4 to 15-dentate or lobate, rarely none; corolla gamopetalous or of distinct petals, the segments 4 to 6, sometimes absent; stamens 2 or 4; ovary superior, 2-celled, the style simple, the stigma usually capitate; fruit a capsule, samara, or drupe, containing 1 to 4 seeds.

The typical plant of the family is the olive ("olivo," "oliva," "aceituno"), *Olea europaea* L., which was introduced into Mexico soon after the Conquest, but is only sparingly cultivated. The lilac ("lila"), *Syringa vulgaris* L., is frequently found in Mexican gardens. Several species of jasmine (*Jasminum*), an Old World genus, are widely cultivated in Mexico, where they are known as "jazmín" (often with varietal names) and "Gran Duque."

Fruit a samara; leaves usually pinnate, sometimes simple____1. **FRAXINUS.**
Fruit baccate, drupaceous, or capsular; leaves simple or lobate, never pinnate.
Fruit a didymous capsule; herbs or small shrubs_____2. **MENODORA.**
Fruit baccate or drupaceous; trees or large shrubs.
Corolla lobes induplicate-valvate. Flowers in terminal panicles.
3. **LIGUSTRUM.**

Corolla lobes or petals imbricate or none.
Flowers in terminal panicles. Corolla of 4 distinct petals.
4. HESPERELAEA.
Flowers axillary or lateral.
Corolla none or of 1 or 2 petals; calyx none or minute.
5. FORESTIERA.
Corolla gamopetalous; calyx well developed_____**6. OSMANTHUS.**

1. FRAXINUS L. Sp. Pl. 1057. 1753.

REFERENCES: Wenzig, Die Gattung *Fraxinus*, Bot. Jahrb. Engler 4: 165–188. 1883; Lingelsheim, Vorarbeiten zu einer Monographie der Gattung *Fraxinus*, Bot. Jahrb. Engler 40: 185–223. 1907; Rehder, The genus *Fraxinus* in New Mexico and Arizona, Proc. Amer. Acad. 53: 199–212. 1917; Lingelsheim in Engl. Pflanzenreich IV. 243[1]: 9–61. 1920.

Shrubs or trees; leaves opposite, usually odd-pinnate, rarely simple; flowers green or white, dioecious or polygamous, fasciculate or paniculate; calyx 4-lobate or dentate, or none; petals 2 to 4, or commonly absent; stamens usually 2; fruit a samara, winged at the apex, usually 1-seeded.

The various species of ash are common in temperate regions of the Northern Hemisphere. Some of them furnish strong wood which is useful for building purposes, interior finish, furniture, and tool handles. They make excellent shade trees and are often planted on that account. The bark contains a glucoside, fraxin, and, like the leaves, has been used in Mexico, the United States, and Europe as a tonic and febrifuge. A decoction of the leaves has been employed in Mexico particularly for yellow fever and malaria. The leaves are said also to have purgative properties, and they have been used for gout and rheumatism. *Fraxinus ornus* L., a species of the Mediterranean region, produces from cuts in the bark an exudate, which is an official drug. manna, of the United States Pharmacopoeia. It is used in medicine as a gentle laxative.

There is a popular belief in some parts of the southern United States that ash leaves are so offensive to rattlesnakes that the latter are never found on land where the trees grow. Hunters are said sometimes to stuff their boots with ash leaves as a preventive of rattlesnake bites.

The ordinary Spanish name for the ash tree, and the one generally employed in Mexico, is "fresno," a derivative of the Latin "fraxinus." The following names are reported for species of doubtful identity: "Yaga-guillaa," "yaga-nisse" (Oaxaca, Zapotec, *Reko*); "paramu" (Michoacán, Tarascan, *Ramírez*); "demettza" (Otomí, *Buelna*).

Petioles and leaf rachis narrowly winged; leaves sometimes simple or trifoliolate.
Leaves all pinnate, with 5 or more leaflets.
Leaflets coarsely serrate_____**1. F. purpusii.**
Leaflets entire or nearly so.
Leaflets small, 1 to 3 cm. long, 2.5 to 8 mm. wide.
Leaflets narrowly oblanceolate_____**2. F. greggii.**
Leaflets ovate_____**3. F. rufescens.**
Leaflets large, mostly 3.5 to 6 cm. long and 8 to 20 cm. wide.
Leaflets glabrous above_____**4. F. schiedeana.**
Leaflets pilose on both surfaces_____**5. F. attenuata.**

Leaves simple, or some of them sometimes trifoliolate.
Fruit 2.5 to 3 cm. long; leaves simple or trifoliolate, if simple long-petiolate----6. F. dipetala.
Fruit 1.5 cm. long; leaves mostly simple, short-petiolate.
Leaves broadly rounded at base----7. F. potosina.
Leaves acute at base----8. F. nummularis.
Petioles and rachis not winged; leaves pinnate, all or most of them with 5 or more leaflets.
Flowers with petals. Leaves usually sharply serrate----9. F. cuspidata.
Flowers without petals.
Wing of the samara equaling or shorter than the body.
Leaflets glabrous or nearly so; wing of the samara usually acutish or at least narrowed to the apex----10. F. berlandieriana.
Leaflets finely pubescent beneath; wing of the samara very obtuse or emarginate----11. F. velutina.
Wing of the samara longer than the body.
Leaflets conspicuously barbate beneath along the costa, even in age. 12. F. uhdei.
Leaflets glabrous beneath or finely pubescent, very inconspicuously if at all barbate.
Leaflets glaucous beneath----13. F. papillosa.
Leaflets green beneath or merely glaucescent.
Venation of the leaflets prominently reticulate beneath. 14. F. standleyi.
Venation not prominently reticulate, only the lateral nerves conspicuous----15. F. pringlei.

1. **Fraxinus purpusii** T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 90. 1910.

Puebla; type from San Simón.

Small tree, glabrous throughout; leaflets 5 or 7, ovate-oblong to lanceolate, 2 to 5 cm. long, acute, obtuse at base, sessile, coarsely serrate, thick, lustrous; flowers apetalous, in very short panicles; samaras 2 cm. long, the wing emarginate, longer than the thick body.

2. **Fraxinus greggii** A. Gray, Proc. Amer. Acad. 12: 63. 1877.

Fraxinus schiedeana parvifolia Torr. U. S. & Mex. Bound. Bot. 166. 1859.

Coahuila to Tamaulipas and Zacatecas. Western Texas.

Shrub or tree, sometimes 8 meters high, with a trunk 20 cm. in diameter, the bark thin, gray, scaly; leaflets usually 5 or 7, sessile, obtuse, glabrous, the margins often revolute; flowers apetalous, in very short clusters; samaras 1.5 to 2 cm. long, the wing much longer than the thick terete body; wood hard, close-grained, brown, its specific gravity about 0.79. "Escobilla," "barreta china" (Coahuila).

The wood is used only for fuel. Palmer reports that in Coahuila the leafy branches are used for making coarse brooms.

3. **Fraxinus rufescens** Lingelsheim, Bot. Jahrb. Engler 40: 218. 1907.

Type from "Sierra de Corton" (Veracruz?).

Shrub or small tree, the branchlets and inflorescence ferruginous-tomentose; leaflets 7 or 9, sessile, 1 to 1.5 cm. long, 5 to 8 mm. wide, subcoriaceous, glabrous, paler beneath; panicles 2 cm. long, the flowers apetalous; samaras 2 to 2.5 cm. long, the wing emarginate.

4. Fraxinus schiedeana Schlecht. & Cham. Linnaea **6**: 391. 1831.

Veracruz; type from Jalapa.

Large shrub or small tree; leaflets 5 to 9, oblong, lance-oblong, or elliptic, sessile, narrowed to the obtuse apex, attenuate at base, glabrous, subcoriaceous, lustrous, the margins subrevolute; samaras about 1.5 cm. long, the wing longer than the body, emarginate.

5. Fraxinus attenuata Jones, Contr. West. Bot. **12**: 59. 1908.

Fraxinus jonesii Lingelsh. in Engl. Pflanzenreich IV. **243**[1]: 35. 1920.

Type from Valley of Palms, Baja California; reported from Chihuahua.

A tree; rachis very narrowly winged; leaflets usually 5, oval, sessile or nearly so, 0.5 to 2 cm. long (very immature), 0.5 to 1 cm wide, entire or obscurely crenulate, whitish-pilose on both surfaces, especially beneath.

6. Fraxinus dipetala Hook. & Arn. Bot. Beechey Voy. 362. *pl. 87*. 1841.

Fraxinus dipetala trifoliolata Torr. U. S. & Mex. Bound. Bot. 167. 1859.

Baja California. California.

Shrub or small tree; leaves simple, or the leaflets 3 to 9, long-petiolulate, oblong to oval or rounded, obtuse or acute, entire or nearly so, thin, glabrous; flowers white, with 2 large petals, the panicles about as long as the leaves; samaras 2 to 3 cm. long.

In the typical form there are 5 to 9 leaflets. The Mexican material is *F. dipetala trifoliolata*, characterized by having simple or trifoliolate leaves. It was reported from Baja California by Goldman[1] as *F. attenuata* Jones.

7. Fraxinus potosina T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 275. 1912.

Type from Minas de San Rafael, San Luis Potosí.

Plants glabrous; leaves simple, suborbicular, 1 to 2.5 cm. long, entire or serrate, coriaceous; samaras 4 to 5 mm. long, the wing rounded at apex, much shorter than the compressed body.

8. Fraxinus nummularis Jones, Contr. West. Bot. **12**: 59. 1908.

Coahuila; type from Sierra Mojada.

Shrub with stiff branchlets; leaves mostly simple but sometimes trifoliolate, the simple leaves oblanceolate to oval, 1 to 2.5 cm. long, obtuse, glabrous, subcoriaceous; flowers apetalous; wing of the samara much longer than the body.

It seems probable that this is a form of *F. greggii*, bearing the same relation to the latter that *F. dipetala trifoliolata* does to *F. dipetala*. In the type collection of *F. nummularis* all the leaves are simple and oval. A specimen from Sierra de Parras (*Purpus* 5064) shows leaves of the same kind, but some of the leaves are trifoliolate, and some of the simple ones are exactly like the leaflets of *F. greggii*.

9. Fraxinus cuspidata Torr. U. S. & Mex. Bound. Bot. 166. 1859.

Fraxinus cuspidata serrata Rehder, Proc. Amer. Acad. **53**: 202. 1917.

Chihuahua and Coahuila. Western Texas to Arizona; type from Texas.

Slender shrub or tree, sometimes 8 meters high, with a trunk 20 cm. in diameter; leaflets 3 to 9, long-petiolulate, linear-lanceolate to ovate, 2 to 7 cm. long, long-attenuate, thin, glabrous; flowers white, sweet-scented, in loose panicles; petals 4, about 1.5 cm. long; samaras about 2 cm. long, the wing equaling or shorter than the flat body. "Fresno."

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[1] Contr. U. S. Nat. Herb. **16**: 360. 1916.

10. Fraxinus berlandieriana A. DC. in DC. Prodr. 8: 278. 1844.

Coahuila to Veracruz and Durango. Western Texas, the type from Austin.

Tree, 10 to 12 meters high, the trunk about 30 cm. in diameter; bark thick, gray, fissured; leaflets 3 to 7, lanceolate or oblong, petiolulate, 4 to 13 cm. long, acute or attenuate, thick, remotely serrulate or subentire; flowers dioecious; samaras 2.5 to 3.5 cm. long, the body terete. "Plumero" (Veracruz); "fresno" (Nuevo León, Durango).

This species is often planted as a shade tree in northeastern Mexico. The samaras are sometimes 3-winged.

11. Fraxinus velutina Torr. in Emory, Mil. Reconn. 149. 1848.

Fraxinus pistaciaefolia Torr. U. S. Rep. Expl. Miss. Pacif. 4: 128. 1856.

Fraxinus toumeyi Britton, N. Amer. Trees 803. *f. 732.* 1908.

Fraxinus velutina toumeyi Rehder, Proc. Amer. Acad. 53: 204. 1917.

Sonora and Chihuahua; perhaps also in Baja California. Western Texas to southern California; type from New Mexico.

Small tree, usually 12 meters high or less, the trunk 20 cm. in diameter; bark gray and rough; leaflets 5 to 9, oblong, lanceolate, or ovate-oblong, 4 to 7 cm. long, acute or acuminate, serrate or subentire; samaras 2 to 3 cm. long, the body terete, the wing obtuse or emarginate. "Fresno."

12. Fraxinus uhdei (Wenzig) Lingelsheim, Bot. Jahrb. Engler 40: 221. 1907.

Fraxinus americana uhdei Wenzig, Bot. Jahrb. Engler 4: 182. 1883.

Sinaloa to San Luis Potosí, Veracruz (?), and Oaxaca.

Tree, 15 to 18 meters high, with dark furrowed bark; leaflets 5 to 9, usually long-petiolulate, lanceolate or oblong-lanceolate 7 to 15 cm. long, long-attenuate, obtuse or acute at base, serrulate, barbate beneath along the costa but elsewhere glabrous; flowers in large panicles, these sometimes 20 cm. long; samaras 2.5 to 4 cm. long. "Fresno" (Jalisco, Sinaloa).

Often planted as a shade tree in the Valley of Mexico, at Guadalajara, and elsewhere.

It is not certain that the specimens described and referred here are identical with those to which Wenzig applied the name *uhdei*. They agree well with his diagnosis except for his statement that the leaflets are sessile.

13. Fraxinus papillosa Lingelsheim, Bot. Jahrb. Engler 40: 219. 1907.

Mountains of Chihuahua; type from Colonia García. Southern New Mexico.

Tree; leaflets 5 to 9, sessile, elliptic to ovate-oblong, 3 to 6 cm. long, acute, serrulate or subentire, glabrous; samaras 2.5 to 3 cm. long, the wing obtuse or emarginate.

14. Fraxinus standleyi Rehder, Proc. Amer. Acad. 53: 208. 1917.

Mountains of northern Sonora. Southern New Mexico and Arizona; type from Organ Mountains, New Mexico.

Tree, usually small but sometimes 15 meters high; leaflets 5 to 9, sessile or petiolulate, elliptic to lanceolate, 4 to 11 cm. long, acute or attenuate, serrulate, glabrous or pubescent beneath; samaras 2 to 3 cm. long.

It is doubtful whether this is distinct from *F. papillosa* and *F. pringlei*, and the three will probably have to be united ultimately.

15. Fraxinus pringlei Lingelsheim, Bot. Jahrb. Engler 40: 221. 1907.

Hidalgo; type from Dublán.

Large tree; leaflets 3 to 7, elliptic to lanceolate, 3 to 11 cm. long, acuminate, serrate, glabrous or nearly so; panicles 5 to 20 cm. long; samaras 2 to 3.5 cm. long, the body terete, the wing obtuse or emarginate.

DOUBTFUL SPECIES.

FRAXINUS OVALIFOLIA (Wenzig) Lingelsh. Bot. Jahrb. Engler 40: 221. 1907. *Fraxinus americana* var. *uhdei β ovalifolia* Wenzig, Bot. Jahrb. Engler 4: 182. 1883. Described from Mexico, the locality not indicated. The fruit is not known and the position of the plant is uncertain. The vernacular name is given as "fresnillo."

2. MENODORA Humb. & Bonpl. Pl. Aequin. 2: 98. 1809.

Plants low, herbaceous or usually woody, at least at base; leaves opposite, or the upper alternate, sessile or nearly so, entire or lobed; flowers perfect, yellow, solitary or corymbose; calyx with 5 to 15 linear lobes; corolla subrotate to salverform, the limb 5 or 6-lobate; stamens 2; capsule didymous, 2-celled, each cell usually 2-seeded.

Corolla tube elongate, longer than the limb, the lobes acuminate.
1. M. longiflora.

Corolla tube shorter than the limb.
Leaves mostly pinnatifid—**2. M. heterophylla.**
Leaves entire.
Calyx lobes 5 or 6—**3. M. scoparia.**
Calyx lobes 7 to 15.
Stems erect, 20 to 50 cm. high; flowers usually corymbose.
Calyx lobes about 12 mm. long, pilosulous—**4. M. mexicana.**
Calyx lobes less than 10 mm. long, glabrate or scaberulous.
Leaves bractlike, 4 to 5 mm. long; stems striate-angulate.
5. M. intricata.
Leaves well developed, larger; stems not conspicuously striate.
6. M. scabra.
Stems diffusely branched, low, spreading; flowers mostly solitary.
Stems hirtellous; leaves mostly oblong-elliptic.
7. M. helianthemoides.
Stems glabrate or scaberulous; leaves linear or nearly so.
8. M. coulteri.

1. Menodora longiflora. A. Gray, Amer. Journ. Sci. II. 14: 45. 1852.
Menodoropsis longiflora Small, Fl. Southeast. U. S. 917. 1903.
Coahuila. Western Texas and southern New Mexico; type from Texas.
Plants erect, usually woody at base, glabrous or scaberulous; leaves linear or lanceolate, 1.5 to 2.5 cm. long, subsessile, entire; flowers few, usually corymbose; corolla yellow, the tube 2 to 5 cm. long.

2. Menodora heterophylla Moric.; DC. Prodr. 8: 316. 1844.
Bolivaria grisebachii Scheele, Linnaea 25: 254. 1852.
Nuevo León and Tamaulipas. Western Texas; type collected between Laredo and San Antonio.
Plants chiefly herbaceous, diffuse and spreading, scaberulous or nearly glabrous; leaves pinnatifid into 3 to 7 linear lobes, or some of them entire; flowers mostly solitary, yellow or purplish; corolla 1 to 1.5 cm. long; capsule about 1 cm. broad.

3. Menodora scoparia Engelm.; A. Gray in Brewer & Wats. Bot. Calif. 1: 471. 1876.
Baja California, Coahuila, and Durango; type from Saltillo, Coahuila. Arizona and southern California.

Plants erect, woody at base, glabrous or scaberulous, the branches striate; leaves linear, 1.5 to 3 cm. long, acute; flowers corymbose, yellow, the corolla 1 to 1.5 cm. long.

4. **Menodora mexicana** (A. DC.) A. Gray, Amer. Journ. Sci. II. **14**: 45. 1852.
Bolivaria mexicana A. DC.; DC. Prodr. **8**: 315. 1844.
Type collected near Oaxaca.
Stems glabrous; lower leaves oblong-obovate, the upper ones linear-lanceolate, 18 mm. long, 4 to 6 mm. wide; corolla slightly longer than the calyx lobes; capsule 6 mm. long.

5. **Menodora intricata** T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 380. 1913.
San Luis Potosí; type from Minas de San Rafael.
Stems herbaceous, glabrous; leaves linear, bractlike; calyx lobes about 10, 5 mm. long; corolla yellow, 1 cm. long.

6. **Menodora scabra** A. Gray, Amer. Journ. Sci. II. **14**: 44. 1852.
Chihuahua to San Luis Potosí and Durango; Baja California. Western Texas to Arizona; type from New Mexico.
Plants herbaceous or woody at base, scaberulous or glabrate; leaves linear or oblong, 1 to 2 cm. long; corolla yellow, 1 to 1.5 cm. long.

7. **Menodora helianthemoides** Humb. & Bonpl. Pl. Aequin. **2**: 98. *pl. 110*. 1809.
Menodora helianthemoides parviflora Greenm. Proc. Amer. Acad. **34**: 369. 1899.
Nuevo León and Zacatecas to San Luis Potosí and Hidalgo; type from Actopán, Hidalgo.
Plants herbaceous or often fruticose, with spreading branches; leaves 5 to 15 mm. long, acute to rounded at apex, usually short-petiolate, pubescent; flowers few, the corolla yellow, 1 cm. long, or sometimes as much as 2 cm. "Jazmincillo del monte" (Nuevo León).

8. **Menodora coulteri** A. Gray, Amer. Journ. Sci. II. **14**: 44. 1852.
Coahuila to San Luis Potosí and Hidalgo; type from Zimapán, Hidalgo.
Plants usually woody, at least at base, the branches crooked and interlaced; leaves mostly 1 to 2 cm. long, sessile, acute, scaberulous; flowers few, the corolla 1 to 1.5 cm. long.
Perhaps only a variant of *M. helianthemoides*.

3. LIGUSTRUM L. Sp. Pl. 7. 1753.

The species are all natives of the Old World. *L. vulgare* L. is the common privet, which is grown extensively for hedges in the United States and is said to be cultivated in Mexico. It differs from the following species in having smaller deciduous leaves.

1. **Ligustrum lucidum** Ait. Hort. Kew. ed. 2. **1**: 19. 1810.
Widely cultivated in Mexico, and in some localities, apparently, escaped from cultivation. Native of China and Japan.
Large shrub or small tree, glabrous throughout; leaves opposite, petiolate, ovate or ovate-lanceolate, 7 to 12 cm. long, acute or acuminate, entire, persistent; flowers perfect, whitish, sessile in large terminal panicles; corolla funnelform, about 3 mm. long, with very short tube and 4 spreading lobes; fruit bluish black, 7 to 10 mm. long. usually 2-seeded. "Trueno" (San Luis Potosí, Mexico, Oaxaca, etc.).
A handsome tree, often planted for shade in Mexican parks and gardens. This species has often been confused with *L. japonicum* Thunb.

4. **HESPERELAEA** A. Gray, Proc. Amer. Acad. 11: 83. 1876.

The genus consists of a single species.

1. **Hesperelaea palmeri** A. Gray, Proc. Amer. Acad. 11: 83. 1876.

Known only from Guadalupe Island, Baja California.

Small glabrous tree, leaves mostly opposite, oblong, 5 cm. long or more, entire, coriaceous; flowers perfect, yellow, in a terminal panicle, the pedicels short, articulate; sepals 4, deciduous; petals 4, spatulate, about 12 mm. long, clawed; stamens 4; fruit drupaceous.

5. **FORESTIERA** Poir. in Lam. Encycl. Suppl. 2: 664. 1811.

Shrubs or small trees; leaves opposite, entire or serrulate, persistent or deciduous, often punctate; flowers small, greenish, polygamous or dioecious, fascicled or racemose, lateral; calyx none or minute and 4-lobate; corolla none or of 1 or 2 small deciduous petals; stamens 2 to 4; fruit a small drupe.

Leaves with conspicuous pores beneath.
  Leaves oblong-ovate to rounded-ovate, 10 to 23 mm. wide---**1. F. reticulata.**
  Leaves linear to oblanceolate-oblong, 1.5 to 7 mm. wide.
    Leaves glabrous----------**2. F. angustifolia.**
    Leaves pubescent on one or both surfaces.
      Leaves linear, glabrous beneath, puberulent above------**3. F. puberula.**
      Leaves oblong-oblanceolate or narrowly elliptic-oblong, densely pubescent beneath----------**4. F. durangensis.**
Leaves without pores beneath.
  Leaves serrulate or crenulate.
    Leaves suborbicular, 7 to 12 mm. long, rounded at apex--**5. F. rotundifolia.**
    Leaves ovate or rounded-ovate, 30 to 50 mm. long, acute or acuminate. **6. F. racemosa.**
  Leaves entire.
    Leaves puberulent on the upper surface----------**7. F. tomentosa.**
    Leaves glabrous on the upper surface.
      Leaves 4.5 to 6 cm. long----------**8. F. chiapensis.**
      Leaves 1 to 3 cm. long.
        Leaves 2 to 3 cm. long; fruit 12 to 15 mm. long----**9. F. macrocarpa.**
        Leaves mostly 1 to 2 cm. long; fruit 6 to 8 mm. long. **10. F. phillyreoides.**

1. **Forestiera reticulata** Torr. U. S. & Mex. Bound. Bot. 167. 1859.

No Mexican specimens have been seen, but the species has been collected along the Rio Grande in Texas, and doubtless occurs on the Mexican side of the river. Western Texas, the type collected near the mouth of the Pecos.

Glabrous shrub or small tree; leaves short-petiolate, 2 to 3 cm. long, acute or obtuse, often serrulate, coriaceous, lustrous, paler beneath; fruit globose-obovoid, 7 mm. long.

2. **Forestiera angustifolia** Torr. U. S. & Mex. Bound. Bot. 168. 1859.

Coahuila, Nuevo León, and Tamaulipas. Western Texas; type collected near the Rio Grande.

Densely branched, glabrous shrub, 1.5 to 4.5 meters high, the branchlets stiff; leaves subsessile, oblanceolate-oblong or linear-oblanceolate, 1 to 2.5 cm. long, 2 to 5 mm. wide, obtuse, bright green, the margins somewhat revolute; fruit ovoid, black, about 6 mm. long. "Panalero" (Tamaulipas).

The fruit is edible but not very palatable.

3. **Forestiera puberula** Eastw. Proc. Amer. Acad. **44**: 605. 1909.

Coahuila and Zacatecas; type from Cedros, Zacatecas.

Shrub, the branchlets short and stiff; leaves 5 to 12 mm. long, the margins strongly revolute; fruit black, about 7 mm. long, conspicuously curved.

4. **Forestiera durangensis** Standl., sp. nov.

Durango; type collected near the city of Durango (*Palmer* 837; U. S. Nat. Herb. no. 304930).

Shrub, 2 to 2.5 meters high, the branchlets short and stiff, densely puberulent at first; leaves short-petiolate, narrowly oblong or oblanceolate-oblong, 12 to 30 mm. long, 4 to 7 mm. wide, obtuse, attenuate at base, entire, coriaceous, sparsely puberulent or glabrate above, densely pubescent beneath; staminate flowers in small dense clusters; stamens 4; fruit oblong, 7 to 8 mm. long. "Palo blanco."

Palmer 323 from Tepehuanes belongs here. It is probably this plant which was listed by Patoni as *F. phillyreoides*, for which the vernacular names are given as "lentisco," "lantisco," "lantrisco," and "acebuche."

5. **Forestiera rotundifolia** (T. S. Brandeg.) Standl.

Adelia rotundifolia T. S. Brandeg. Univ. Calif. Publ. Bot. **3**: 386. 1909.

Type from Cerro de Matzize, Puebla.

Glabrous shrub, 2 meters high; leaves short-petiolate, coriaceous, lustrous, crenulate.

6. **Forestiera racemosa** S. Wats. Proc. Amer. Acad. **25**: 158. 1890.

Nuevo León; type from the Sierra Madre near Monterrey.

Slender shrub or small tree, 4.5 to 6 meters high; leaves slender-petiolate, rounded at base, coriaceous, glabrous and lustrous above, pilosulous or glabrate beneath; fruit subglobose, 6 mm. long, bluish black.

7. **Forestiera tomentosa** S. Wats. Proc. Amer. Acad. **25**: 157. 1890.

Jalisco to Puebla; type collected near Guadalajara.

Shrub, 3 to 4.5 meters high, with stiff branches; leaves oblong to elliptic or ovate, 1.5 to 3.5 cm. long, obtuse or rounded at apex, obtuse or acute at base, short-petiolate, coriaceous; fruit ellipsoid, bluish black, 6 to 10 mm. long. "Pico de pájaro" (Michocán); "mimbre" (Jalisco).

8. **Forestiera chiapensis** Standl., sp. nov.

Type from Canjob, Chiapas (*Goldman* 794; U. S. Nat. Herb. no. 470599).

Branchlets puberulent when young but soon glabrous; leaves short-petiolate, broadly elliptic, 4.5 to 6 cm. long, 2.3 to 3 cm. wide, obtusely short-acuminate, acute or obtuse at base, thin, entire, glabrous; staminate flowers in lax racemes about 1 cm. long; stamens 2 to 4.

9. **Forestiera macrocarpa** T. S. Brandeg. Zoe **4**: 404. 1894.

Type from Sierra San Lázaro, Cape Region of Baja California.

Shrub or small tree, 2 to 6 meters high, glabrous; leaves elliptic or oblong-ovate, obtuse or acutish, cuneate at base, thin; fruit oblong, dark blue.

10. **Forestiera phillyreoides** (Benth.) Torr. U. S. & Mex. Bound. Bot. 167. 1859.

Piptolepis phillyreoides Benth. Pl. Hartw. 29. 1840.

Jalisco to Guanajuato and Puebla; type from Guanajuato.

Shrub, 2 to 3 meters high; leaves short-petiolate, ovate to oval or obovate, obtuse or rounded at apex, acute at base, pubescent or glabrate beneath, the margins usually revolute; fruit ellipsoid, black.

6. OSMANTHUS Lour. Fl. Cochinch. 28. 1790.

All the other species are natives of Asia and the Pacific islands.

1. **Osmanthus americana** (L.) Benth. & Hook.; A. Gray, Syn. Fl. 2[1]: 78. 1878.
Olea americana L. Mant. Pl. 24. 1767.

Veracruz and Oaxaca. Southern United States.

Shrub or tree, sometimes 15 meters high, with a trunk 30 cm. in diameter, the bark thin, scaly, dark gray or reddish gray; leaves opposite, petiolate, persistent, elliptic to oblanceolate, 7 to 14 cm. long, acuminate, attenuate or acute at base, leathery, lustrous, entire, glabrous; flowers whitish, fragrant, in short axillary racemes or panicles; calyx with 4 deltoid lobes; corolla 3 to 4 mm. long, the limb 4-lobate; stamens 2; fruit a drupe, oval or obovoid, 1.2 to 1.8 cm. long, yellow-green to deep purple, the flesh dry and thin; wood hard, close-grained, dark brown, its specific gravity about 0.81.

Known in the United States as "devilwood." The writer has seen two Mexican specimens, one from Cumbre del Obispo (*Schiede*), and one from Monte Pelado, Oaxaca (*Galeotti* 529). Although not in the best condition for comparison, they seem to agree perfectly with specimens from the United States.

139. LOGANIACEAE. Logania Family.

Shrubs, trees, or herbs, sometimes scandent; leaves opposite, entire or toothed, estipulate but the petioles usually united by a stipular line; flowers perfect, large or small, variously arranged, regular; calyx inferior, campanulate or tubular, 4 or 5-lobate; corolla gamopetalous, funnelform, salverform, or tubular, the limb 4 or 5-lobate; stamens as many as the corolla lobes and alternate with them, inserted in the throat or tube of the corolla; style simple, the stigma capitate or lobate; fruit capsular, baccate, or drupaceous.

Several genera of the family are represented in Mexico only by herbaceous species.

Stigma bifid.
- Plants scandent; capsule compressed, many-seeded; seeds winged. **1. GELSEMIUM.**
- Plants erect; capsule terete, 2-seeded; seeds each with a tuft of bristles at apex.

Stigma entire or nearly so ..... **2. PLOCOSPERMA.**
- Leaves quintuplinerved; fruit baccate ..... **3. STRYCHNOS.**
- Leaves pinnate-nerved; fruit capsular.
  - Corolla tubular, about 3.5 cm. long; stamens exserted ..... **4. EMORYA.**
  - Corolla short-salverform, less than 1 cm. long; stamens not exserted. **5. BUDDLEIA.**

1. GELSEMIUM Juss. Gen. Pl. 150. 1789.

One other species is known, a native of eastern Asia.

1. **Gelsemium sempervirens** (L.) Ait. Hort. Kew 2: 64. 1811.
Bignonia sempervirens L. Sp. Pl. 623. 1753.

Veracruz, Puebla, Oaxaca, and Chiapas. Guatemala; southern United States.

Slender scandent glabrous shrub; leaves persistent, short-petiolate, lanceolate, 3.5 to 7.5 cm. long, attenuate, rounded or obtuse at base, entire; flowers in axillary 1 to 6-flowered cymes, short-pedicellate; calyx 5-lobate; corolla funnelform, 5-lobate, bright yellow, 2.5 to 3.5 cm. long; stamens 5; capsule compressed, elliptic, 2-celled, septicidally dehiscent, 8 to 15 mm. long; seeds winged.

A handsome vine, known in the United States as "yellow jasmine." The root is reported to contain an alkaloid, gelsemine. A tincture of the root is sometimes administered in domestic practice for rheumatism and gonorrhea. It is said to act as an arterial sedative, and in larger doses to produce insensibility to pain, but its use is dangerous or even fatal. Large doses are said to cause vertigo and perverted vision.

2. PLOCOSPERMA Benth. in Benth. & Hook. Gen. Pl. 2: 789. 1876.

1. **Plocosperma microphyllum** Baill.; Solenreder in Engl. & Prantl, Pflanzenfam. 4^2: 50. 1895.

Oaxaca, and perhaps elsewhere.

Rigid shrub; leaves fasciculate or opposite, subsessile, oval or oblong, 8 to 13 mm. long, rounded or shallowly emarginate at apex, rounded at base, entire, coriaceous, glabrous; flowers solitary or fasciculate in the axils, 5-parted; fruit a terete capsule, 4 to 6 cm. long, 3 to 4 mm. in diameter; seeds 2, about 2 cm. long, each with a dense tuft of silky bristles at the apex.

3. STRYCHNOS L. Sp. Pl. 189. 1753.

The genus consists of about 200 species of trees, shrubs, or vines, distributed in the tropics of both hemispheres. Some of the species have edible fruit. The seeds of *S. nux-vomica* L., of India, furnish the drugs strychnine and nux-vomica.

1. **Strychnos tepicensis** Standl., sp. nov.

Sinaloa and Tepic; type from Acaponeta, Tepic (*Rose* 1441; U. S. Nat. Herb. 300272).

Branches glabrous or when young sparsely hirtellous; leaves opposite, the petioles 3 to 5 mm. long, hirtellous or glabrous, the blades ovate-elliptic, 5.5 to 10 cm. long, 2.5 to 5 cm. wide, acuminate or long-acuminate, obtuse at base, coriaceous, glabrous, entire, quintuplinerved, the venation prominent beneath; seeds strongly compressed, rounded-triangular or rounded, about 2 cm. in diameter and 6 mm. thick.

The material is very imperfect, consisting of leafy branches and a few seeds, but it seems desirable to assign a specific name to it for the purpose of convenience.

No species of the genus has been reported definitely from Mexico, but there are casual reports of *S. triplinervia* Mart., a Brazilian plant, from San Juan Bautista, Tabasco, where it is said to be known as "cabalonga de Tabasco," "mata-perros," and "veneno del diablo." The Tabascan plant is probably not *S. triplinervia*, but it may be one of the few species that have been described from Central America.

4. EMORYA Torr. U. S. & Mex. Bound. Bot. 121. 1859.

A single species is known.

1. **Emorya suaveolens** Torr. U. S. & Mex. Bound. Bot. 121. *pl. 36.* 1859.

Nuevo León. Type collected in canyons of the Rio Grande below Presidio del Norte.

Shrub, 1 to 2 meters high; leaves opposite, short-petiolate, ovate or rhombic, 1.5 to 5 cm. long, obtuse, obtuse or truncate at base, coarsely sinuate-dentate, glabrate above, minutely whitish-tomentulose beneath; flowers in narrow terminal thyrsiform panicles, sweet-scented; calyx tubular, 4-lobate; corolla tubular, 3.5 cm. long, greenish yellow; stamens 4, exserted; fruit a 2-celled capsule.

The genus was named for Major William H. Emory, United States Commissioner to the Mexican Boundary Survey.

5. BUDDLEIA L. Sp. Pl. 112. 1753.

Shrubs or small trees, usually with stellate tomentum; leaves entire or toothed; flowers small, in heads or dense cymes, these solitary and axillary or spicate or paniculate; calyx campanulate, 4-dentate; corolla short-salverform, the 4 lobes imbricate, spreading in anthesis; stamens 4; capsule septicidally bivalvate.

Some of the Old World species have showy flowers and are cultivated for ornament. The leaves of *B. madagascariensis* Lam. were formerly employed in Madagascar as a soap substitute, and the plant is used as a remedy for asthma, coughs, and bronchitis. Some of the members of the genus are said to be used for poisoning fish. The usual Mexican name for all the species is "tepozán."

Under the name "topoçan," Sahagún mentions one species which was employed as a diuretic and to "regulate the digestion and moderate the heat of the body." In another place he says: "There is a medicinal tree called *tepoçan*. Its leaves are long, velvety, rounded, and pointed. In color they are somewhat whitish green, and they exhale a rather unpleasant odor. The tree is good for heat of the head in either children or adults. The roots are large and long and have a slightly disagreeable odor. Cut up, pulverized, and mixed with the root of *tepexiloxochitlacotl*, they are good to stop nosebleed."

Hemsley listed 26 species of *Buddleia* from Mexico, and others have been described since. Many of them, however, have been based upon trivial characters and must be reduced to synonymy.

Flowers in dense heads, these spicate or racemose or sometimes solitary.
  Heads distinctly pedunculate.
    Heads mostly terminal and solitary.
      Leaves 1 to 3 cm. long, obtuse or rounded at apex—**1. B. marrubiifolia.**
      Leaves 4.5 to 6 cm. long, acuminate—**2. B. saltillensis.**
    Heads axillary, racemose.
      Leaves petiolate, the petioles not dilated at base—**3. B. wrightii.**
      Leaves sessile, or with dilated clasping petioles.
        Leaves coarsely serrate, contracted into a short petiole, this broadly marginate and dilated at base—**4. B. chapalana.**
        Leaves crenulate, sessile—**5. B. perfoliata.**
  Heads all or mostly sessile.
    Leaves sessile, never contracted into a winged petiole, small, mostly 1 to 3 cm. long, narrowly oblong—**6. B. scordioides.**
    Leaves petiolate, or at least contracted into a winged petiole, mostly 4 to 12 cm. long or larger, commonly lanceolate or ovate.
      Heads 3 to 7-flowered; leaves obtuse, 7 cm. long or less. **7. B. tuxtlica.**
      Heads many-flowered; leaves acute or acuminate, usually longer. **8. B. sessiliflora.**

Flowers in cymes, or capitate but the heads paniculate.
  Leaves rounded or cordate at base, not decurrent.
    Leaves covered beneath with a minute close whitish tomentum. **9. B. tomentella.**
    Leaves covered beneath with a loose floccose brownish tomentum.
      Leaves rounded at apex—**10. B. elliptica.**

Leaves acute or acuminate.
Leaves usually quickly glabrate on the upper surface; flower clusters partly short-pedunculate----------11. **B. cordata.**
Leaves persistently tomentose on the upper surface; flower clusters all sessile---------- **12. B. crotonoides.**
Leaves acute to attenuate at base or decurrent.
Flower clusters in panicled spikes or racemes.
Flower clusters all closely sessile----------13. **B. floccosa.**
Flower clusters, at least the lower ones, pedunculate-14. **B. americana.**
Flower clusters loosely paniculate, neither spicate nor racemose.
Flowers 4 mm. long----------15. **B. nitida.**
Flowers 2 to 3 mm. long----------16. **B. parviflora.**

1. Buddleia marrubiifolia Benth. in DC. Prodr. **10:** 441. 1846.

Chihuahua, Coahuila, Nuevo León, and Zacatecas; type from Monterrey, Nuevo León. Western Texas.

Shrub, about 1 meter high or less; leaves short-petiolate, oval, rounded, or rhombic, acute or decurrent at base, coarsely crenate, densely stellate-tomentose; flower heads globose, 10 to 12 mm. in diameter, very dense, the flowers yellow or orange. "Azafrán" ("saffron"; Zacatecas, Coahuila); "azafrán del campo" (Chihuahua; Coahuila); "azafrancillo," "azafranillo" (Coahuila).

A decoction of the flowers is employed in Coahuila to give a yellow or orange color to vermicelli and butter. The decoction is used also in the form of a bath for rheumatism, and the plant is used popularly as an aperitive and diuretic.

2. Buddleia saltillensis Kränzlein, Bot. Jahrb. Engler **50:** Beibl. **111:** 41. 1913.

Type from Saltillo, Coahuila (the locality is given erroneously by Kränzlein as "Texas").

Leaves lanceolate, petiolate, short-pilose above, ferruginous-tomentose beneath; flower heads few or several-flowered, 2 cm. long, subcylindric; calyx 2.5 mm. long.

Known to the writer only from the original description.

3. Buddleia wrightii Robinson, Bot. Gaz. **16:** 341. 1891.

Sonora to Tepic; type from Mazatlán River, Sinaloa.

Shrub, 2 to 3 meters high; leaves ovate to narrowly lanceolate, 6 to 22 cm. long, acuminate or attenuate, attenuate or abruptly decurrent at base, serrate or entire, tomentulose or glabrate; flower heads 1 to 1.5 cm. in diameter. "Teposana" (Sinaloa).

Perhaps only a form of *B. sessiliflora.*

4. Buddleia chapalana Robinson, Proc. Amer. Acad. **26:** 169. 1891.

Jalisco; type from Lake Chapala.

Shrub, 1 meter high or less; leaves oblong to rhombic-ovate, 2.5 to 6.5 cm. long, acute, stellate-pilose, the petioles united at base around the stem; flower heads slender-pedunculate, about 1 cm. in diameter, very dense, globose.

5. Buddleia perfoliata H. B. K. Nov. Gen. & Sp. **2:** 346. 1817.

Buddleia sphaerantha Schlecht. & Cham. Linnaea **5:** 104. 1830.

San Luis Potosí, Veracruz, Querétaro, Hidalgo, and Puebla; type collected between Chalco and Mexico.

Shrub, 1 to 1.5 meters high, densely brownish-tomentose throughout; leaves lanceolate to oblong, 3 to 8 cm. long, acute or attenuate, narrowed and connate

at base; flower heads 8 to 10 mm. in diameter, very dense, globose. "Salvia real" (San Luis Potosí, Veracruz); "salvia de bolita" (Mexico); "salvia india" (Querétaro).

The plant is very aromatic and slightly bitter. A hot tea made from the leaves is administered for neuralgic pains and as a stimulating medicine. The plant is employed also to reduce perspiration, especially in tuberculosis.

6. **Buddleia scordioides** H. B. K. Nov. Gen. & Sp. **2**: 345. *pl. 183*. 1817.

Buddleia scordioides capitata S. Wats. Proc. Amer. Acad. **18**: 116. 1883.

Chihuahua to San Luis Potosí, Hidalgo, and Mexico; type collected near the City of Mexico. Western Texas and southern Arizona.

Aromatic shrub, a meter high or less; leaves coarsely crenate, rugose, tomentose, or glabrate above; flower heads 5 to 8 mm. in diameter, densely lanate. "Salvia" (Durango); "escobilla" (Durango, Coahuila, San Luis Potosí, Valley of Mexico); "hierba de las escobas" (San Luis Potosí); "golondrilla" (Durango, Coahuila).

Tea made from the plant is much used as a remedy for indigestion. Stock are said to be fond of the shrub.

7. **Buddleia tuxtlica** Loesener, Verh. Bot. Ver. Brandenb. **53**: 73. 1911.

Type from Hacienda Petapa, Distrito de Tuxtla, Chiapas.

Leaves lanceolate to oblong or subrhombic, 2 to 7 cm. long, serrate or entire, decurrent to base of petiole, densely stellate-tomentose beneath; calyx 2 mm. long.

Known to the writer only from the original description.

8. **Buddleia sessiliflora** H. B. K. Nov. Gen. & Sp. **2**: 345. *pl. 183*. 1817.

Buddleia verticillata H. B. K. Nov. Gen. & Sp. **2**: 346. *pl. 184*. 1817.

Buddleia pseudoverticillata Mart. & Gal. Bull. Acad. Brux. **12**[2]: 24. 1845.

Buddleia melliodora Kunth, Ind. Sem. Hort. Berol. 10. 1845.

Buddleia barbata Kunth, Ind. Sem. Hort. Berol. 12. 1847.

Buddleia pringlei A. Gray, Proc. Amer. Acad. **19**: 86. 1883.

Buddleia simplex Kränzlein, Ann. Naturhist. Hofmus. Wien **26**: 396. 1912.

Sonora to Coahuila, San Luis Potosí, Mexico, and Oaxaca; type collected near the City of Mexico. Southern Arizona.

Shrub or small tree, 1 to 5 meters high; leaves narrowly lanceolate to broadly rhombic-ovate, 5 to 18 cm. long; attenuate or decurrent at base, entire or serrate, usually densely tomentose, at least beneath, but sometimes glabrous; flower heads 1 to 2 cm. in diameter, usually dense and many-flowered, sometimes in naked terminal spikes, the flowers greenish yellow, very fragrant. "Tepozán" (Querétaro, Aguascalientes, Morelos, Guanajuato, Tamaulipas); "hierba del tepozán" (Sinaloa); "tepoja" (Michoacán, Guerrero); "tepoza" (Jalisco); "tepozán verde" (Guanajuato); "lengua de vaca" (Morelos, Oaxaca); "tepuza," "tepozancillo," "salvia" (*Urbina*); "mispatle," "quimixpatli" (Valley of Mexico).

A tea made from the leaves, bark, and roots is taken internally for various purposes, and the leaves, boiled with salt, are applied to wounds and sores.

9. **Buddleia tomentella** Standl., sp. nov.

Coahuila, Nuevo León, and Zacatecas; type from Saltillo, Coahuila (*Palmer* 138; U. S. Nat. Herb. no. 336132).

Shrub, the branchlets minutely tomentulose; leaves long-petiolate, ovate-lanceolate to oblong-ovate or deltoid-ovate, 5 to 11 cm. long, acute or acuminate, entire or crenate-serrate, tomentulose above at first but soon glabrate, covered beneath with a very dense, minute, closely appressed, pale tomentum, coriaceous; flower heads small, few-flowered, in large terminal naked panicles,

these 10 to 25 cm. long; calyx 2 to 2.5 mm. long, tomentulose, the lobes deltoid, obtuse or acute; corolla barbate within, the tube about as long as the calyx, the 4 lobes rounded, tomentulose outside; capsule 5 mm. long. "Tepozán" (Coahuila, Zacatecas).

The following additional collections belong here: *Palmer* 869, 718, 709, 138½; *Arsène* 6380; *Pringle* 1887.

10. Buddleia elliptica Mart. & Gal. Bull. Acad. Brux. 12²: 24. 1845.

Type from Pico de Quinceo, near Morelia, Michoacán, altitude 2,100 meters.

Leaves short-petiolate, elliptic-rounded, 7.5 cm. long, 5 cm. wide, tomentose beneath, entire; flower heads crowded, densely paniculate.

Known to the writer only from the original description.

11. Buddleia cordata H. B. K. Nov. Gen. & Sp. 2: 348. *pl. 185.* 1817.

Buddleia acuminata H. B. K. Nov. Gen. & Sp. 2: 349. *pl. 187.* 1817. Not *B. acuminata* Poir. 1810.

Buddleia humboldtiana Roem. & Schult. Syst. Veg. 3: Mant. 93. 1827.

Buddleia ovalifolia Kunth, Ind. Sem. Hort. Berol. 1844.

Buddleia maerophylla Kunth, Ind. Sem. Hort. Berol. 1844.

Buddleia cordata tcposan Loesener, Verh. Bot. Ver. Brandenb. 53: 73. 1911.

Chihuahua to San Luis Potosí, Mexico, Chiapas, and Oaxaca; type from Guanajuato.

Shrub or small tree, 4.5 to 6 meters high; leaves long-petiolate, narrowly lanceolate to ovate, 8 to 30 cm. long, acute or attenuate, usually subcordate at base but rarely only obtuse or even short-decurrent, entire or serrulate, when young often loosely tomentose above but usually soon glabrous, loosely tomentose beneath, the tomentum persistent, sometimes with a minute tomentum beneath the longer hairs; flower heads in very large, naked, terminal panicles. "Tepozán" (Mexico, Durango, Tlaxcala); "tepozán blanco" (Guanajuato, *Dugès*).

Decoction of the bark and root used as a diuretic, for uterine affections, and for rheumatism.

12. Buddleia crotonoides A. Gray, Proc. Amer. Acad. 5: 165. 1861.

Southern Baja California; type from Cape San Lucas.

Shrub, densely brown-tomentose throughout; leaves short-petiolate, oblong-ovate or deltoid-ovate, 7 to 12 cm. long, acuminate, rounded or subcordate at base, thick, crenate; flower heads small, in panicled spikes.

13. Buddleia floccosa Kunth, Ind. Sem. Hort. Berol. 1844.

? *Buddleia propinqua* Kunth, Ind. Sem. Hort. Berol. 1844.

Buddleia floccosa crassifolia Loesener, Verh. Bot. Ver. Brandenb. 53: 72. 1911.

Michoacán to Morelos and Oaxaca. Central America.

Shrub, 1 to 3 meters high; leaves short-petiolate, narrowly or broadly lanceolate, 4 to 15 cm. long, acute or attenuate, sessile or short-petiolate, sometimes abruptly long-decurrent at base, entire or serrate, brown-tomentose beneath, tomentulose or glabrate above; flower clusters 1 cm. in diameter or less, very dense. "Tepozán," "tzompantle" (Oaxaca, *Seler*).

14. Buddleia americana L. Sp. Pl. 112. 1753.

? *Buddleia intermedia* H. B. K. Nov. Gen. & Sp. 2: 350. 1817.

Buddleia callicarpioides H. B. K. Nov. Gen. & Sp. 2: 350. 1817.

Buddleia floribunda H. B. K. Nov. Gen. & Sp. 2: 352. 1817.

Buddleia rufescens Willd.; Roem. & Schult. Syst. Veg. 3: Mant. 97. 1827.

Buddleia decurrens Schlecht. & Cham. Linnaea 5: 105. 1830.

Michoacán to Tamaulipas, Veracruz, and Chiapas. West Indies; Central and South America.

Shrub or small tree, 2 to 4 meters high; leaves petiolate, narrowly lanceolate to broadly ovate, 7 to 18 cm. long, acute to attenuate, decurrent at base, serrate or entire, usually glabrate above, tomentose or glabrate beneath; flower heads in panicled, leafy or naked spikes; flowers yellow. "Tepozán" (Veracruz, Mexico, Oaxaca, Nicaragua); "topozán" (Oaxaca, etc.); "zompantle" (Veracruz); "topoza" (*Herrera*); "zayolizán, "layolizán," "cayolizán," "cayolozán," "zayolizcán," "cayolinán" (*Nueva Farm. Mex.*) "hierba de la mosca" (Oaxaca, *Reko*); "salvia real" (*Sessé & Mociño*); "salvia" (El Salvador); "salvia sija," "salvia santa" (Guatemala); "tabaquillo" (Panama); "tabaco de monte," "salvia blanca" (Colombia).

The plant has a camphor-like odor. A decoction of the leaves, bark, and roots has been employed as a diuretic, especially in dropsy, as a healing lotion for wounds, and for rheumatic pains and uterine affections. In Colombia the leaves are applied to the forehead to relieve headache.

15. Buddleia nitida Benth. in DC. Prodr. **10**: 437. 1846.

Type from Chiapas. Guatemala.

Leaves petiolate, lance-oblong, 5 to 12 cm. long, acuminate, usually acute at base, entire, coriaceous, glabrate above, closely brownish-tomentose beneath; panicles short and dense.

16. Buddleia parviflora H. B. K. Nov. Gen. & Sp. **2**: 353. 1817.

Buddleia microphylla H. B. K. Nov. Gen. & Sp. **2**: 353. 1817.

Buddleia abbreviata H. B. K. Nov. Gen. & Sp. **2**: 353. 1817.

Buddleia lanceolata Benth. Pl. Hartw. 48. 1840.

Buddleia gracilis Kunth, Ind. Sem. Hort. Berol. 1844.

Buddleia venusta Kunth, Ind. Sem. Hort. Berol. 1844.

Buddleia ligustrina Loesener, Repert. Sp. Nov. Fedde **9**: 359. 1911.

Buddleia monticola Loesener, Repert. Sp. Nov. Fedde **9**: 360. 1911.

Sinaloa (?) and Jalisco to Durango, San Luis Potosí, Veracruz, and Oaxaca; type from Cuernavaca, Morelos.

Shrub or small tree, 1 to 6 meters high; leaves petiolate or subsessile, narrowly lanceolate to ovate, 2 to 10 cm. long, acute or attenuate, serrate or entire, usually glabrate above but densely tomentulose beneath; flower heads few-flowered, often loose, in small or large panicles. "Tepozán" (Sinaloa); "tepozán cimarrón," "tepozán de cerro" (Mexico).

DOUBTFUL SPECIES.

Buddleia teucrioides Kränzlein, Ann. Naturhist. Hofmus. Wien **26**: 397. 1912. Locality not known, but probably Mexican.

140. APOCYNACEAE. Dogbane Family.

Shrubs or trees, rarely herbs, often scandent, with milky juice; leaves entire, estipulate, opposite, verticillate, or alternate; flowers usually in cymes, terminal or lateral, large or small, perfect, regular; calyx inferior, the segments united at base, often glandular within at base, usually 5-parted; corolla gamopetalous, usually salverform or funnelform, the limb commonly 5-lobate; stamens 5, inserted on the tube or throat of the corolla, the filaments short, the anthers narrow, free but often connivent, frequently appendaged at base; style 1, simple or cleft at base; fruit of 2 carpels, these dry or fleshy, dehiscent or indehiscent.

Two genera, *Amsonia* and *Apocynum*, are represented in Mexico only by herbaceous species. It is possible that *Allamanda cathartica* L. may extend into Mexico or at least be in cultivation. It is a woody vine with large showy yellow flowers.

Anther cells not appendaged at base; plants never scandent.
  Leaves all alternate.
    Carpels of the fruit many-seeded, dehiscent. Corolla salverform.
      1. PLUMERIA.
    Carpels 1 or 2-seeded, indehiscent.
      Corolla salverform; carpels about 1 cm. long---------- **2. VALLESIA.**
      Corolla funnelform; carpels much larger---------- **3. THEVETIA.**
  Leaves opposite or verticillate.
    Carpels of the fruit 1 or 2-seeded, almost wholly connate. Leaves verticillate---------- **4. RAUWOLFIA.**
    Carpels with more numerous seeds, free, at least above.
      Leaves mostly verticillate. Carpels long and slender, dehiscent.
        5. TONDUZIA.
      Leaves opposite.
        Calyx glandular within; carpels fleshy, usually indehiscent.
          Corolla salverform---------- **6. TABERNAEMONTANA.**
          Corolla funnelform---------- **7. STEMMADENIA.**
        Calyx eglandular; carpels dry, dehiscent.
          Carpels slender, terete; seeds not winged; herbs or low shrubs.
            8. CATHARANTHUS.
          Carpels broad, compressed; seeds broadly winged; large trees.
            9. ASPIDOSPERMA.

Anther cells appendaged at base and sometimes at apex; plants usually scandent.
  Corolla with 5 scales in the throat; leaves verticillate. Plants erect.
    10. NERIUM.
  Corolla without scales; leaves opposite.
    Tips of the anthers exserted from the corolla.
      Corolla subrotate, the tube very short.
        Cymes umbel-like---------- **11. THENARDIA.**
        Cymes spikelike---------- **12. FORSTERONIA.**
      Corolla salverform, the tube elongate---------- **13. PRESTONIA.**
    Tips of the anthers not exserted.
      Corolla funnelform, the throat evidently dilated.
        Plants erect---------- **14. MACROSIPHONIA.**
        Plants scandent.
          Calyx eglandular---------- **15. RHABDADENIA.**
          Calyx glandular within.
            Anthers with a subulate twisted appendage at apex.
              16. URECHITES.
            Anthers not appendaged at apex, obtuse to acuminate.
              17. MANDEVILLA.
      Corolla salverform.
        Calyx eglandular. Plants erect---------- **18. HAPLOPHYTON.**
        Calyx glandular within.
          Flowers racemose---------- **19. ECHITES.**
          Flowers cymose.
            Corolla tube twisted---------- **20. STREPTOTRACHELUS.**
            Corolla tube not twisted---------- **21. SECONDATIA.**

1. PLUMERIA L. Sp. Pl. 209. 1753.

Shrubs or trees with thick branches and copious milky sap; leaves alternate, petiolate; flowers large, in terminal cymes; calyx 5-cleft, eglandular; corolla salverform, with slender tube; anthers obtuse, not appendaged, fruit of 2 large divergent many-seeded follicles; seeds flat, winged.

The generic name is often written incorrectly as *Plumiera* and *Plumieria*.

Leaves pubescent beneath. Flowers white or yellow.
- Leaves oblong-linear, 1.5 to 3.5 cm. wide, the margins revolute---**1. P. alba.**
- Leaves elliptic to elongate-oblong, mostly 4 to 7.5 cm. wide, the margins not revolute.
  - Leaves elongate-oblong, about 5 times as long as broad--**2. P. megaphylla.**
  - Leaves mostly elliptic or elliptic-oblong, 3 times as long as broad or less----------**3. P. mollis.**

Leaves glabrous or nearly so.
- Corolla red or purple----------**4. P. rubra.**
- Corolla white----------**5. P. acutifolia.**

1. Plumeria alba L. Sp. Pl. 210. 1753.

Yucatán, probably introduced and perhaps only in cultivation. Native of West Indies but often cultivated elsewhere.

Tree, 3 to 8 meters high; bark gray or whitish, slightly roughened; leaves short-petiolate, 16 to 30 cm. long, obtuse or acute, glabrous and lustrous above, minutely tomentulose beneath; corolla white, about 6 cm. long; follicles 18 to 20 cm. long. "Sabanicté" (Yucatán, Maya); "flor de pan" (Nicaragua); "amapola de Venus" (Central America); "amancayo," "azuceno" (Colombia); "lirio blanco," "lirio silvestre," "alelí blanco," "atabaiba" (Cuba); "tabaiba," "tapaiba" (Porto Rico); "amapola" (Venezuela).

The wood is said to be yellowish white or pale yellowish gray, compact, fine-grained, and strong. The juice is said to be poisonous and caustic; it is sometimes employed in the West Indies as a remedy for cutaneous and venereal diseases.

2. Plumeria megaphylla A. DC. in DC. Prodr. **8**: 391. 1844.

Type from Puebla.

Leaves about 30 cm. long, 5 to 7.5 cm. wide, acuminate, glabrous above, puberulent or pubescent beneath along the nerves; corolla 5 cm. long or more, yellow.

3. Plumeria mollis H. B. K. Nov. Gen. & Sp. **3**: 230. 1819.

Tepic and Jalisco to Aguascalientes and Chiapas. Type from the Orinoco River.

Leaves 12 to 23 cm. long, short-petiolate, acute or short-acuminate, acute at base, glabrous above, pubescent beneath or finally glabrate; corolla white, 5 to 7 cm. long; follicles 15 to 25 cm. long.

4. Plumeria rubra L. Sp. Pl. 209. 1753.

?*Plumeria xanthostoma* Schlecht. Linnaea **8**: 523. 1833.

Yucatán, Puebla, and Chiapas, and doubtless elsewhere, at least in cultivation. West Indies; Central and South America.

Shrub or tree, 8 meters high or less, the branchlets pubescent; leaves elliptic-oblong to elliptic-obovate, 15 to 40 cm. long, acute or obtuse and short-pointed, obtuse or acute at base; corolla 3.5 to 5.5 cm. long; follicles 15 to 25 cm. long, about 2.5 cm. thick. "Sabanicté," "chacnicté," "nicté" (Yucatán, Maya); "flor de mayo" (Yucatán, Puebla, El Salvador); "flor de la cruz" (Guatemala,

El Salvador); "flor del toro" (Nicaragua); "caracacha colorada," "caracucho," "palo de cruz" (Panama); "Alejandría" (Morelos, Central America); "flor de señora" (El Salvador); "alelí" (Porto Rico); "lirio colorado" (Cuba); "flor de ensarta" (El Salvador).

The flowers are handsome and sweet-scented. They are often strung with those of other colors to hang as festoons in churches.

A related species, *P. tricolor* Ruiz & Pav., in which the corolla is pink and yellow within, red and white outside, is said to be cultivated in Mexico, and to be known as "flor de mayo" and "ensalada." The corollas are said to be used for making sweetmeats and as a remedy for coughs.

5. Plumeria acutifolia Poir. Encycl. Suppl. **2**: 667. 1811.

Plumeria mexicana Lodd. Bot. Cab. *pl. 1024*. 1825.

Plumeria lambertiana Lindl. Bot. Reg. *pl. 1378*. 1830.

Plumeria gouani D. Don; G. Don, Hist. Dichl. Pl. **4**: 94. 1838.

Baja California and Sonora to Chihuahua, Veracruz, and Oaxaca. Widely dispersed in tropical America, and also naturalized in the Old World tropics.

Shrub or tree, 3 to 9 meters high, the branchlets usually pubescent; leaves oblong to elliptic, 15 to 30 cm. long or more, acute to long-acuminate, with numerous parallel lateral nerves; corolla 6 to 7 cm. long, the tube about equaling or much shorter than the lobes; follicles 10 to 25 cm. long, sometimes as much as 4 cm. wide. "Cacaloxochitl" (Baja California, Veracruz, Mexico, etc., Nahuatl); "cacalosúchil" (Oaxaca, etc.); "súchil" (Oaxaca); "jacalosúchil blanco" (Jalisco); "flor del cuervo," "campotonera," "campechana," "Alejandría" (various localities); "tizaxochitl"; "quie-chachi" (Oaxaca, Zapotec, *Reko*); "suchlcahue" (Oaxaca, *Reko*); "ahaipuih" (Mixe, *Belmar*); "cacalojoche," "juche" (Costa Rica); "sacuanjoche" (Nicaragua); "flor de la cruz," "flor de ensarta," "flor de mayo" (El Salvador); "calcachuchi" (Philippines).

The beautiful sweet-scented flowers were a favorite among the ancient Mexicans, and especially popular with the nobility. They are still greatly admired by the Mexican people, who often plant the tree in their gardens and use the flowers for decorations, especially in churches. The Indians often wear them in their hair. The name "frangipanni" is applied to this and related species, likewise "temple flower" and "graveyard-flower." The juice is sometimes employed in treating wounds and venereal diseases, and it is said to produce a good quality of rubber.

2. VALLESIA Ruiz & Pav. Fl. Peruv. Chil. 2: 26. 1799.

Shrubs or small trees; leaves short-petiolate, persistent, alternate; flowers in pedunculate cymes opposite the leaves; calyx eglandular, with 5 short lobes; corolla salverform, the tube enlarged below the lobes; anthers cordate, not appendaged; fruit a 1 or 2-seeded drupe; seeds naked.

The following species are the only ones known. The genus was named in honor of Francisco Valles, physician to Phillip II of Spain.

Leaves mostly obtuse, densely pubescent ..... **1. V. laciniata.**
Leaves acute or acuminate, glabrous.
  Corolla 15 to 18 mm. long ..... **2. V. mexicana.**
  Corolla about 5 mm. long ..... **3. V. glabra.**

1. Vallesia laciniata T. S. Brandeg. Proc. Calif. Acad. II. **2**: 182. 1889.

Baja California; type material collected at San Sebastián and Comondú.

Shrub, 1 meter high or less, the branchlets densely pubescent; leaves oblong or lanceolate, 2.5 to 7 cm. long; cymes dense, many-flowered; corolla 10 to 12 mm. long; fruit white.

2. Vallesia mexicana Muell. Arg. Linnaea **30**: 393. 1860.

Veracruz; type from Orizaba. Guatemala.

Shrub; branchlets glabrous or sparsely pubescent; leaves oblong-lanceolate or elliptic-lanceolate, 8 to 11 cm. long, obtuse or acute at base; cymes dense, many-flowered, the flowers short-petiolate.

Neriandra aurantiaca Mart. & Gal.[1] is probably the same plant.

3. Vallesia glabra (Cav.) Link, Enum. Hort. Berol. **1**: 207. 1821.

Rauwolfia glabra Cav. Icon. Pl. **3**: 50. 1794.

Vallesia dichotoma Ruiz & Pav. Fl. Peruv. Chil. **2**: 26. 1799.

Vallesia cymbifolia Orteg. Hort. Matr. Dec. 58. 1800.

Rauwolfia oppositiflora Sessé & Moc. Pl. Nov. Hisp. 32. 1887.

Baja California and Sonora to Querétaro, Hidalgo, and Oaxaca. Florida, West Indies, and South America.

Shrub or tree, 1 to 6 meters high, glabrous or nearly so; leaves narrowly lanceolate to oblong-lanceolate, 3 to 6 cm. long, rather fleshy, obtuse or acute at base; cymes few-flowered; corolla white; fruit oblong, about 1 cm. long, white. "Cacarahue," "otatave" (Sinaloa); "frutilla" (Querétaro); "huelatave" (Baja California); "palo boniato" (Cuba).

The fruit is sometimes eaten by children, and its juice is employed as a remedy for inflammation of the eyes.

3. THEVETIA Adans. Fam. Pl. **2**: 171. 1763.

Shrubs or small trees; leaves alternate, 1-nerved or pinnate-nerved; flowers large, yellow, in terminal cymes; calyx 5-parted, glandular within at base, the segments spreading; corolla funnelform, the tube cylindric, abruptly expanded into the campanulate throat; anthers small, lanceolate; fruit drupaceous, broader than long, obcompressed, the endocarp nutlike, 2-celled; seeds large, with acute edges.

Leaves linear or nearly so.

Leaves glabrous beneath, the lateral nerves obsolete——1. **T. peruviana.**

Leaves usually pubescent or tomentose beneath, the lateral nerves conspicuous——2. **T. thevetioides.**

Leaves oblanceolate-oblong to obovate.

Leaves glabrous beneath.

Narrow portion of the corolla tube scarcely exceeding the calyx.

3. T. gaumeri.

Narrow portion of the corolla tube several times as long as the calyx.

4. T. plumeriaefolia.

Leaves pubescent beneath.

Leaves acuminate——5. **T. nitida.**

Leaves obtuse or rounded at apex, or rarely acutish——6. **T. ovata.**

1. Thevetia peruviana (Pers.) Merrill, Philip. Journ. Sci. **9**: 130. 1914.

Cerbera thevetia L. Sp. Pl. 209. 1753.

Cerbera peruviana Pers. Syn. Pl. **1**: 267. 1805.

Thevetia neriifolia Juss.; Steud. Nom. Bot. ed. 2. **2**: 680. 1841.

Thevetia thevetia Millsp. Field Mus. Bot. **2**: 83. 1900.

San Luis Potosí and Veracruz to Yucatán, Chiapas, and Guerrero. Florida, West Indies, and Central and South America.

Shrub or tree, 10 meters high or less; bark gray; leaves 7 to 15 cm. long, 0.5 to 1 cm. wide, acute, long-attenuate at base, lustrous; corolla about 7 cm.

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[1] Bull. Acad. Brux. **11**: 356. 1844.

long, the tube much shorter than the limb; fruit triangular, 3 to 4 cm. broad, about 2 cm. long, and 1 to 1.5 cm. thick, subtruncate. "Chirca" (Chiapas, Costa Rica, Guatemala); "campanilla" (Yucatán, Morelos, Guerrero, Panama, Philippines); "acitz" (Yucatán, Maya); "naranjo amarillo" (San Luis Potosí, *Ramírez*); "yoyote," "yoyotli" (Veracruz, Guerrero, *Ramírez*); "narciso amarillo" (Jalisco, *Oliva*); "chilca" (Nicaragua, Guatemala); "caballón" (Porto Rico); "cabalonga," "cobalonga" (Cuba, Porto Rico, Colombia); "amancay," "aje de monte," "pepa de cruz," "castañeto" (Colombia); "chilindrón," "campanilla amarilla" (El Salvador); "lengua de gato," "retama" (Venezuela); "camache," "caruache" (Guiana).

The tree is showy when in flower and is often cultivated in the tropics. In Florida it is known as "trumpet-flower" and "yellow oleander," and in the British West Indies as "lucky-nut," and "luck-seed." The flowers are very sweet-scented. The wood is said to be soft and fibrous and to have a specific gravity of about 0.80. The milky juice and the seeds are poisonous. In Yucatán cotton soaked in the juice is placed in cavities in teeth to relieve toothache. The seeds have been reported to yield a glucoside, thevetine. A tincture of the bark is considered a powerful febrifuge and in large doses is a violent purgative and emetic.

2. Thevetia thevetioides (H. B. K.) K. Schum. in Engl. & Prantl, Pflanzenfam. 4²: 159. 1895.

Cerbera thevetioides H. B. K. Nov. Gen. & Sp. 3: 223. 1819.

Thevetia yccotli A. DC. in DC. Prodr. 8: 343. 1844.

Thevetia yccotli glabra A. DC. in DC. Prodr. 8: 343. 1844.

Michoacán to Tamaulipas, Veracruz, and Oaxaca; type collected near Taxco and Tehuilotepec (Guerrero).

Shrub or small tree, 3 to 9 meters high; leaves 7 to 14 cm. long, 5 to 10 mm. wide, acute or attenuate, long-attenuate at base, the margins usually revolute; corolla 8 to 9 cm. long, the tube shorter than the limb; fruit about 4 cm. wide, 3 cm. long, and 3 cm. thick. "Codo de fraile" (Hidalgo); "yucucaca" (Oaxaca, Mixtec, *Reko*); "fraile" (Guanajuato); "cabrito" (Jalisco); "narciso amarillo" (Morelos); "calaveritas" (Oaxaca); "tzinacanytlacuatl" (*Herrera*); "yoyote" or "yoyotl" (from the Nahuatl *yoyotli*); "huesos de fraile" (fruit); "joyote," "joyota."

The seeds contain about 40 per cent of oil and also a glucoside, thevetin, and they are considered very poisonous. Taken internally they act as a violent vomitive, hinder respiration, and cause paralysis of the heart. They have been given in Mexico as a substitute for digitalis, but their use is dangerous. They are a popular remedy for hemorrhoids, and some of the Indians consider them a remedy for rattlesnake bites. They are said to have been worn about the ankles as rattles in certain dances. The leaves or the juice were employed by the Aztecs for deafness, cutaneous diseases, ulcers, and toothache.

3. Thevetia gaumeri Hemsl. in Hook, Icon. Pl. 16: *pl. 1517*. 1886.

Thevetia spathulata Millsp. Field Mus. Bot. 2: 383. 1898.

Yucatán; type from Cozumel Island.

Tree, 6 to 18 meters high, glabrous throughout; leaves oblanceolate, 5 to 12 cm. long, obtuse, long-attenuate at base, lustrous above, paler beneath; corolla 3.5 to 5 cm. long, the tube much shorter than the throat; fruit compressed, 3 cm. broad, 2 cm. long.

4. Thevetia plumeriaefolia Benth. Bot. Voy. Sulph. 124. *pl. 43.* 1844.

Veracruz and Oaxaca. Central America; type from Gulf of Fonseca, Honduras.

Glabrous tree; leaves oblanceolate-oblong to oblong-obovate, 13 to 23 cm. long, 4.5 to 7 cm. wide, acute or abruptly short-acuminate, acute at base, lustrous; corolla 4 to 5 cm. long, the tube longer than the throat. "Chilindrón" (Guatemala); "cojón de gato" (Guatemala, Honduras); "chirca venenosa" (Costa Rica); "tomatillo" (Colombia); "chilindrón blanco" (El Salvador).

5. Thevetia nitida (H. B. K.) A. DC. in DC. Prodr. **8**: 344. 1844.

Cerbera nitida H. B. K. Nov. Gen. & Sp. **3**: 225. 1819.

Reported from Tabasco and Yucatán. Panama; type from Colombia.

Leaves oblong-oblanceolate, 20 to 25 cm. long, 4 to 5 cm. wide, lustrous above, pilosulous beneath; corolla tube about 2.5 cm. long. "Ojo de venado" (*Conzatti*).

6. Thevetia ovata (Cav.) A. DC. in DC. Prodr. **8**: 344. 1844.

Cerbera ovata Cav. Icon. Pl. **3**: 35. *pl. 270.* 1794.

Cerbera cuneifolia H. B. K. Nov. Gen. & Sp. **3**: 224. 1819.

Thevetia cuneifolia A. DC. in DC. Prodr. **8**: 344. 1844.

Thevetia cuneifolia andrieuxii A. DC. in DC. Prodr. **8**: 344. 1844.

Sinaloa and Jalisco to Chiapas. Reported from Guatemala.

Shrub or small tree, 2 to 5 meters high; leaves narrowly cuneate-oblong to broadly obovate, 5.5 to 11 cm. long, 1.5 to 4.5 cm. wide, cuneate or attenuate at base, glabrate and lustrous above, densely pubescent beneath; corolla 6 to 8 cm. long, the tube shorter than the throat; fruit scarcely compressed, 3.5 to 4 cm. broad, 2 to 3 cm. long. "Regalgar" (Sinaloa); "huevo de gato" (Jalisco); "meriendita"; "naranjo amarillo (*Ramírez*); "narciso amarillo" (Michoacán); "cascabel" (Guatemala); "chirca venenosa" (Costa Rica).

As in other species, the seeds are reputed to be very poisonous. The Indians carry them in their pockets as a preventive of hemorrhoids.

4. RAUWOLFIA L. Sp. Pl. 208. 1753.

Shrubs or small trees; leaves usually verticillate, short-petiolate; flowers small, in pedunculate, mostly axillary cymes; calyx eglandular, 5-cleft; corolla salverform; stamens included, the anthers obtuse, not appendaged; fruit of 2 drupes, these connate, the fruit thus somewhat didymous.

Leaves densely and finely pubescent beneath ..... **1. R. canescens.**
Leaves glabrous beneath or pubescent along the costa.
Leaves linear-lanceolate ..... **2. R. longifolia.**
Leaves elliptic-oblong to elliptic or obovate ..... **3. R. heterophylla.**

1. Rauwolfia canescens L. Sp. Pl. ed. 2. 303. 1762.

Veracruz; Sinaloa to Guerrero. Guatemala, West Indies, and northern South America.

Shrub, 4.5 meters high or less, the branchlets pubescent; leaves in whorls of 3 to 5, elliptic-oblong to elliptic-obovate, 5 to 10 cm. long, acute or obtuse at each end, puberulent or glabrate on the upper surface; cymes few or rarely many-flowered; corolla about 4 mm. long; fruit black, 6 to 8 mm. in diameter. "Venenito" (Colombia).

The fruit contains a black juice which has been employed for dyeing. If eaten it causes violent inflammation of the alimentary canal or even death. A decoction of the bark is used externally in the West Indies as a remedy for

chronic cutaneous diseases and to destroy parasites. It is also administered internally for syphilitic affections.

The calyx lobes are usually very obtuse, but in a specimen from Acapulco they are acuminate. The same variation is found in West Indian specimens.

2. **Rauwolfia longifolia** A. DC. in DC. Prodr. 8: 338. 1844.

Veracruz and Oaxaca; type from San Miguel Sola, Oaxaca.

Leaves ternate, 7.5 to 12.5 cm. long, 1 to 2 cm. wide, acuminate at each end, glabrous; cymes many-flowered; calyx glabrous, the lobes ovate, acute; flowers 12 mm. long, the corolla lobes acute.

3. **Rauwolfia heterophylla** Roem. & Schult. Syst. Veg. 4: 105. 1819.

Sinaloa to San Luis Potosí, Veracruz, Yucatán, Tabasco, and Oaxaca. Cuba; Central and South America.

Shrub, 1 to 2 meters high; leaves in whorls of 3 to 5, 3 to 10 cm. long, acute or acuminate, usually acute at base, glabrous or pubescent only beneath along the costa; cymes few-flowered; calyx lobes obtuse, usually ciliate; corolla greenish white, about 2.5 mm. long; fruit 6 to 8 mm. in diameter, red at first, purple-black at maturity. "Cabamuc' (Yucatán); "sarna de perro" (Colima); "cocotombo" (Guerrero, *Sessé & Mociño*); "guataco colorado," "viborilla," "comida de culebra" (Nicaragua); "cohatacó" (Costa Rica); "señorita," "amatillo," "hierba de San José," "matacoyote" (El Salvador).

The plant has milky sap. The crushed root was employed in Guerrero, according to Sessé and Mociño[1] (who list the plant as *Rauwolfia nitida*, a West Indian species), as a remedy for erysipelas, and the leaves for healing ulcers. In Colima the root decoction is used as a gargle for the throat and as a wash for the gums. The juice of the fruit is used as ink and also for dyeing. The fruit itself is reputed to be poisonous.

5. TONDUZIA Pittier, Contr. U. S. Nat. Herb. 12: 103. 1908.

Two other Central American species have been described. The genus was named for Señor Don Adolfo Tonduz, well known for his botanical work in Costa Rica.

1. **Tonduzia parvifolia** Pittier, Contr. U. S. Nat. Herb. 12: 103. 1908.

Oaxaca. Costa Rica; type from Angostura.

Shrub or small tree, glabrous; leaves mostly verticillate, petiolate, linear-lanceolate or narrowly oblong-lanceolate, 6 to 12 cm. long, acuminate or attenuate, attenuate at base, coriaceous; flowers white, in terminal and axillary cymes; calyx 5-parted, 1 to 1.2 mm. long; corolla salverform, the tube 4 to 5 mm. long; carpels slender, terete; seeds flat, elliptic, ciliate. "Chamicillo" (Oaxaca).

6. TABERNAEMONTANA L. Sp. Pl. 210. 1753.

Shrubs or trees, usually glabrous; leaves opposite; flowers in terminal cymes, sometimes sublateral, white or yellowish; calyx 5-lobate, glandular within; corolla salverform, the tube cylindric, the lobes contorted; anthers sagittate, not appendaged; fruit of 2 fleshy short follicles.

Calyx lobes linear-subulate; flowers 5 cm. long ..... 1. **T. litoralis.**
Calyx lobes ovate, usually obtuse; flowers less than 5 cm. long.
  Tips of the anthers not exserted ..... 2. **T. citrifolia.**
  Tips of the anthers exserted.
    Corolla tube about 6 mm. long ..... 3. **T. alba.**
    Corolla tube 8 to 15 mm. long ..... 4. **T. amygdalifolia.**

[1] Pl. Nov. Hisp. 32. 1887.

1. **Tabernaemontana litoralis** H. B. K. Nov. Gen. & Sp. 3: 228. 1819.

Type from Campeche; reported also from Tabasco, Veracruz, Guerrero, and British Honduras.

Leaves elliptic-oblong, about 12 cm. long and 5 cm. wide, subacuminate, acute at base; sepals fleshy, the margins imbricate; corolla tube 4 to 5 times as long as the calyx; stamens included.

Known to the writer only from the original description. The vernacular names "sicte" and "sictillo" are reported from Tabasco, but they may pertain to some other species.

2. **Tabernaemontana citrifolia** L. Sp. Pl. 210. 1753.

Tabernaemontana martensii Peyr. Linnaea 30: 31. 1859.

Tabernaemontana paisavelensis Loesener, Bull. Herb. Boiss. 2: 555. 1894.

Tamaulipas, Veracruz, Tabasco, and Oaxaca. West Indies; Central and South America.

Glabrous shrub or small tree; leaves petiolate, oblanceolate-oblong to oblong-obovate or elliptic, 6 to 20 cm. long, acute or very abruptly short-acuminate, acute at base; flowers white, in dense or lax cymes, pedicellate; corolla tube 6 to 8 mm. long. "Cojón de gato" (Veracruz); "lecherillo" (Oaxaca); "palo de San Diego" (Tamaulipas); "cachito" (Nicaragua); "pegojo," "lechoso" (Cuba); "huevo de gallo" (Cuba, Porto Rico); "guacharaco," "cojón de cabrito," "turma de perro" (Colombia).

The flowers are sweet-scented. The milky juice is sometimes applied to warts to destroy them. In the West Indies the plant has been employed as a remedy for fevers.

3. **Tabernaemontana alba** Mill. Gard. Dict. ed. 8. *Tabernaemontana* no. 2. 1768.

Reported from Veracruz and Yucatán.

Leaves ovate-oblong, 12 to 15 cm. long, 5 to 6 cm. wide, abruptly short-acuminate, acute at base, petiolate; cymes many-flowered.

Known to the writer only from description.

4. **Tabernaemontana amygdalifolia** Jacq. Enum. Pl. Carib. 14. 1760.

Tabernaemontana acapulcensis Miers, Apocyn. S. Amer. 57. 1878.

Sinaloa to Oaxaca and Yucatán. Central and South America.

Shrub, 2 to 4.5 meters high, glabrous throughout; leaves elliptic to narrowly lance-oblong, 5 to 17 cm. long, acute or acuminate, acute at base; corolla white; follicles 4 to 6 cm. long, 1.5 to 2 cm. thick, smooth. "Berraco de la costa," "berraco" (Sinaloa); "chusumpek" (Yucatán Maya); "cojón de puerco" (Oaxaca, El Salvador); "utzupek," "olfato de perro" (Yucatán, *Seler*); "jazmín de perro" (Oaxaca, Yucatán); "huevos de toro" (Guerrero, Oaxaca); "cojón de toro" (Oaxaca); "rejalgar" (Oaxaca, *Reko*); "platanito" (Colombia); "huevo de gato" (Panama); "jazmín del monte" (Panama, El Salvador); "chilindrón," "cojón macho," "leche de perra," "amatillo" (El Salvador).

7. STEMMADENIA Benth. Bot. Voy. Sulph. 124. 1844.

Shrubs or small trees; leaves opposite; flowers large, usually yellow, few, in terminal cymes; calyx 5-parted, the lobes imbricate, glandular within; corolla funnelform, the tube expanded into a broad throat, the lobes contorted; stamens included, the anthers sagittate, not appendaged; fruit of 2 short fleshy divaricate follicles.

Leaves glabrous beneath.
Corolla tube 2 to 2.5 cm. long----------1. S. bella.
Corolla tube 3 to 5.5 cm. long.
Corolla tube about 3 cm. long----------2. S. bignoniaeflora.
Corolla tube about 5 cm. long----------3. S. insignis.
Leaves pubescent beneath, at least along the costa.
Leaves barbate beneath along the costa, elsewhere glabrous or nearly so. 4. S. palmeri.
Leaves pubescent beneath over the whole surface.
Calyx about 5 mm. long----------5. S. tomentosa.
Calyx 12 to 20 mm. long----------6. S. mollis.

1. **Stemmadenia bella** Miers, Apocyn. S. Amer. 77. 1878.

Veracruz to Michoacán and Guerrero; reported from Tabasco; type from Orizaba, Veracruz.

Shrub, 2 meters high or more, glabrous throughout; leaves elliptic-ovate or oblong-elliptic, 7 to 12 cm. long, abruptly acuminate, acute at base; corolla lobes 12 to 15 mm. long. "Lechoso" (Michoacán, Guerrero).

2. **Stemmadenia bignoniaeflora** (Schlecht.) Miers, Apocyn. S. Amer. 77. 1878.

Echites bignoniaeflora Schlecht. Linnaea **26**: 372. 1853.

Described from Mexico, the locality not known.

Glabrous shrub; leaves lance-elliptic, 10 cm. long, 4.5 cm. wide, acute at each end, on short marginate petioles; calyx 12 to 14 mm. long.

Known to the writer only from description.

3. **Stemmadenia insignis** Miers, Apocyn. S. Amer. 76. 1878.

Jalisco to Veracruz and Yucatán; type from Mérida, Yucatán.

Shrub or small tree, glabrous throughout; leaves short-petiolate, elliptic to elliptic-oblong or elliptic-obovate, 8 to 18 cm. long, abruptly acuminate, acute at base; calyx 12 to 15 mm. long; fruit carpels about 5 cm. long and 3 cm. wide, sharp-pointed. "Laurel" (Yucatán).

4. **Stemmadenia palmeri** Rose & Standl., sp. nov.

Sinaloa to Chihuahua, Morelos, and Jalisco; type from Imala, Sinaloa (*Palmer* 1470; U. S. Nat. Herb. no. 305608).

Shrub or small tree, 1 to 6 meters high, the branchlets glabrous; leaves on long or short petioles, elliptic or oblong-elliptic, 6 to 18 cm. long, abruptly short-acuminate, acute at base, glabrous above, densely barbate beneath along the costa or in age rarely glabrate; calyx lobes 4 to 6 mm. long, obtuse or acute, glabrous; corolla tube 3 to 4.5 cm. long, the lobes of about the same length; fruit carpels 4.5 cm. long and 3 cm. wide or smaller, falcate-ovoid. "Berraco," "tapaco" (Sinaloa).

5. **Stemmadenia tomentosa** Greenm. Proc. Amer. Acad. **35**: 310. 1900.

Type collected near Zapotlán, Jalisco.

Shrub, 3 to 4.5 meters high; leaves short-petiolate, elliptic or oblong-elliptic, acuminate, acute at base, glabrous above, tomentose beneath; corolla yellow, 7.5 to 8 cm. long.

6. **Stemmadenia mollis** Benth. Bot. Voy. Sulph. 125. 1844.

Guerrero to Chiapas and Veracruz. Guatemala; type from Guayaquil, Ecuador.

Shrub or small tree, 3 to 7.5 meters high, the branchlets pubescent; leaves elliptic-oblong to broadly elliptic, 5 to 17 cm. long, obtuse or abruptly short-acuminate, pubescent on both surfaces; corolla yellow, 7 to 8 cm. long. "Cojón de puerco" (Oaxaca); "cojón" (Guatemala, El Salvador); "flor del día" (El Salvador).

8. CATHARANTHUS Don, Hist. Dichl. Pl. 4: 95. 1838.

1. Catharanthus roseus (L.) Don, Hist. Dichl. Pl. 4: 95. 1838.

Vinca rosea L. Syst. Nat. ed. 10. 944. 1759.

Lochnera rosea Reichenb. Consp. Veg. 134. 1828.

Ammocallis rosea Small, Fl. Southeast U. S. 936. 1903.

Cultivated in Mexico for ornament and in some places naturalized; specimens have been seen only from Sinaloa and Yucatán, but the plant must be much more widely distributed. Widely dispersed in the tropics of both hemispheres.

Plants herbaceous or woody at base, 1 meter high, thinly pubescent; leaves opposite, short-petiolate, oblong to elliptic, 3 to 8 cm. long, obtuse or retuse; flowers solitary or geminate in the axils; calyx 5-cleft; corolla salverform, white or pink, the slender tube 2.5 to 3 cm. long; follicles cylindric, 2 to 3 cm. long, pubescent. "Maravilla de España" (Mexico); "flor de todo el año," "jazmín del mar" (Porto Rico); "vicaria," "Dominica" (Cuba); "chichirica" (Philippines); "chula," "mulata" (El Salvador).

In the United States and the British West Indies the plant is known as "vinca," "old maid," "red periwinkle," and erroneously as "sweet-william." The flowers are showy and the plant is easily propagated. In Madagascar the bitter astringent leaves are employed as a vomitive, and the roots are said to be purgative, vermifuge, depurative, and hemostatic, and to be a remedy for toothache.

9. ASPIDOSPERMA Mart. & Zucc. Nov. Gen. & Sp. 1: 57. 1824.

1. Aspidosperma megalocarpon Muell. Arg. Linnaea 30: 400. 1860.

Type from Colipa, Veracruz. Guatemala.

Large tree; leaves petiolate, oblong, 12 to 22 cm. long, acute, obtuse at base, coriaceous, glabrous, lustrous, often unequal at base; follicles obliquely reniform-obovate, 12 cm. long and 10 cm. wide, rounded-obtuse, glabrous; seed body compressed, 2 to 2.5 cm. broad, surrounded by a broad thin wing, the whole 7 to 9 cm. in diameter. "Volador" (Veracruz); "chichique," "chíchica" (Guatemala).

10. NERIUM L. Sp. Pl. 209. 1753.

1. Nerium oleander L. Sp. Pl. 209. 1753.

Cultivated in all the warmer parts of Mexico, and in places naturalized. Native of the Mediterranean region, but cultivated in all warm regions and in many places naturalized.

Shrub or small tree, glabrous or obscurely puberulent; leaves mostly ternate, short-petiolate, linear-oblong or linear-oblanceolate, acute, coriaceous; flowers pink or white, fragrant, often double, in terminal cymes; calyx 5-parted, glandular within; corolla funnelform, the limb 5-lobate; follicles elongate, straight, appressed. "Laurel rosa," "laurel blanco," "laurel colorado" (Mexico, Porto Rico, Ecuador); "adelfa" (Mexico, Porto Rico, Ecuador, Guam); "yaga-quiegueze" (Oaxaca, Zapotec, *Reko*); "narciso" (Guatemala, El Salvador); "berbería" (Venezuela); "rosa laurel" (Mexico, Guam); "adelfa sencilla" (Porto Rico); "laurel rosado" (Porto Rico, Colombia); "flor de Habana" (Colombia).

The oleander is one of the handsomest of cultivated shrubs and is abundantly planted in Mexican parks and gardens. The plant contains alkaloids which act as a powerful cardiac poison, and has been employed in medicine as a heart stimulant and tonic. It has long been used in southern Europe for destroying rats, and sometimes for poisoning people. An infusion of the

leaves in oil has been used as a remedy for cutaneous diseases and to destroy parasites. In Venezuela the juice of the leaves has been employed for keeping away or destroying flies, and also to remove warts.

11. THENARDIA H. B. K. Nov. Gen. & Sp. 3: 210. 1819.

Scandent shrubs; leaves opposite, petiolate; flowers in umbel-like cymes, pseudo-axillary, slender-pedicellate; calyx 5-parted, glandular within; corolla subrotate, the tube very short, the lobes dextrorsely contorted; stamens exserted, the anthers sagittate, connivent, appendaged at base; fruit of 2 elongate follicles.

Corolla about 12 mm. long----------1. T. floribunda.
Corolla 6 mm. long----------2. T. galeottiana.

1. **Thenardia floribunda** H. B. K. Nov. Gen. & Sp. 3: 210. *pl. 240.* 1819.
Thenardia suaveolens Mart. & Gal. Bull. Acad. Brux. 11: 359. 1844.

Michoacán to Mexico and Oaxaca; type collected near the City of Mexico.

Large vine, glabrous throughout, the branches slender; leaves slender-petiolate, lance-oblong or ovate-oblong, 5.5 to 13.5 cm. long, acuminate or long-acuminate, obtuse at base; cymes pedunculate, many-flowered, 8 to 11 cm. broad, the flowers greenish white, sometimes tinged with purple; anthers 5 to 6 mm. long. "Petatillo" (Oaxaca).

2. **Thenardia galeottiana** Baill. Bull. Soc. Linn. Paris 2: 819. 1890.

Guerrero and Oaxaca.

Stems slender, glabrous; leaves lanceolate or narrowly lanceolate, 4 to 7.5 cm. long, attenuate, obtuse or acute at base; cymes few-flowered, about 3 cm. broad, puberulent; anthers 2.5 mm. long.

12. FORSTERONIA Meyer, Prim. Fl. Esseq. 135. 1818.

1. **Forsteronia spicata** (Jacq.) Meyer, Prim. Fl. Esseq. 135. 1818.
Echites spicata Jacq. Enum. Pl. Carib. 13. 1760.

Michoacán or Guerrero; reported from Campeche. Guatemala; Colombia, the type from Cartagena.

Woody vine; leaves opposite, short-petiolate, oblong to broadly oval, 5 to 15 cm. long, abruptly short-acuminate, rounded or obtuse at base, sparsely pilosulous beneath or glabrate; flowers white, the cymes spiciform, dense, terminal and axillary; calyx lobes ovate, acuminate, corolla 4 to 5 mm. long, pubescent outside and within, the lobes acute.

The writer has seen no Colombian specimens, but the Mexican plant agrees well with the descriptions. The latter may, however, represent a distinct species.

13. PRESTONIA R. Br. Mem. Wern. Soc. 1: 69. 1809.

Scandent shrubs; leaves opposite, petiolate; flowers in cymes, these pseudo-axillary; calyx 5-parted, the segments broad or narrow; corolla salverform, the tube slender, the 5 lobes broad, dextrorsely contorted; anthers sagittate, connivent, semiexserted, appendaged at base; follicles erect or divergent.

Calyx lobes linear or linear-lanceolate.
Leaves velutinous-pubescent beneath----------1. P. contorta.
Leaves obscurely puberulent or glabrate beneath----------2. P. langlassei.
Calyx lobes ovate or ovate-cordate.
Leaves glabrous----------3. P. schizadenia.
Leaves densely sericeous or pilose.
Leaves broadly elliptic or rounded-elliptic----------4. P. mexicana.
Leaves ovate-lanceolate----------5. P. sericea.

1. **Prestonia contorta** (Mart. & Gal.) Hemsl. Biol. Centr. Amer. Bot. **2**: 311. 1881.

Haemadictyon contortum Mart. & Gal. Bull. Acad. Brux. **11**: 360. 1844. Type from Zacatepec, Oaxaca.

Leaves petiolate, oval, acuminate, subcordate at base, pubescent above, velutinous beneath; cymes dense, bifid, longer than the leaves; corolla about 2.5 cm. long, red, the lobes ovate-rounded.

2. **Prestonia langlassei** Standl., sp. nov.

Sinaloa to Guerrero; type from La Correa, Michoacán or Guerrero, altitude 50 meters (*Langlassé* 435; U. S. Nat. Herb. no. 385945).

Stems slender, obscurely puberulent or glabrate; petioles slender, 10 to 16 mm. long; leaf blades oblong-ovate, 5.5 to 10 cm. long, 2.2 to 5 cm. wide, truncate or subcordate at base, acuminate or cuspidate-acuminate at apex, thin, obscurely puberulent, the lateral nerves 6 or 7 on each side; cymes many-flowered, nearly as long as the leaves, pedunculate; pedicels puberulent, 10 to 17 mm. long; calyx lobes linear, about 5 mm. long; corolla blackish red, the tube 18 to 20 mm. long, sparsely villosulous, the lobes about 1 cm. long; anthers conspicuously exserted.

3. **Prestonia schizadenia** (Muell. Arg.) Hemsl. Biol. Centr. Amer. Bot. **2**: 312. 1881.

Haemadictyon schizadenium Muell. Arg. Linnaea **30**: 431. 1860.

Type from Papantla, Veracruz.

Branches scabrid; leaves short-petiolate, oblong-ovate or oblong-elliptic, 12 to 15 cm. long, 4.5 cm. wide, short-acuminate, rounded or cordate at base; cymes half as long as the leaves; calyx 14 mm. long, glabrous; corolla 2.5 cm. long, glabrous.

4. **Prestonia mexicana** (A. DC.) Hemsl. Biol. Centr. Amer. Bot. **2**: 312. 1881.

Haemadictyon mexicanum A. DC. in DC. Prodr. **8**: 428. 1844.

Guerrero to San Luis Potosí, Veracruz, and Morelos. Central America.

Large scandent shrub; leaves very short-petiolate, 8 to 16 cm. long, 5 to 12 cm. wide, rounded or obtuse at apex and shortly cuspidate, rounded or subcordate at base, densely covered with fulvous pubescence; calyx 1.5 to 2.5 cm. long, the lobes ovate or lance-oblong; corolla about 4 cm. long, densely pilose; follicles divaricate, about 8 cm. long and nearly 2 cm. thick, densely hispid; seeds with a coma of long soft hairs. "Cacha de chivo" (El Salvador).

5. **Prestonia sericea** Mart. & Gal. Bull. Acad. Brux. **11**: 360. 1844.

Type collected in Oaxaca.

Stems villous; leaves subsessile, acuminate, subcordate at base, villous above, sericeous-tomentose beneath; calyx lobes cordate-ovate, acuminate; corolla sericeous-villous.

Probably only a form of *P. mexicana*.

14. MACROSIPHONIA Muell. Arg. in Mart. Fl. Bras. 6[1]: 137. 1860.

Plants erect, low, fruticose or suffrutescent; leaves mostly opposite, sessile or short-petiolate; flowers large and showy, terminal or becoming lateral, short-pedicellate; calyx 5-parted, glandular within, the lobes narrow; corolla funnelform, the tube slender, elongate, enlarged above; anthers oblong or sagittate, appendaged at base; follicles long and slender, erect.

Leaves orbicular or reniform-orbicular, as broad as long_____1. **M. hesperia.**
Leaves linear to oval, longer than broad.
Leaves green beneath, thinly puberulent_____2. **M. brachysiphon.**
Leaves white-tomentose beneath.

Corolla tube 7.5 to 12.5 cm. long_____3. **M. macrosiphon.**
Corolla tube 3 to 5.5 cm. long_____4. **M. hypoleuca.**

1. **Macrosiphonia hesperia** Johnston, Proc. Calif. Acad. **12**: 1125. 1924.
Southern Baja California; type from Carmen Island.

Leaves short-petiolate, orbicular or reniform-orbicular, 1.5 to 3 cm. long and broad, rounded at apex and apiculate, truncate or subcordate at base, densely velutinous-pilosulous above, beneath very densely pilose but scarcely tomentose; follicles 6 to 8 cm. long, 3 to 4 mm. thick, densely puberulent.

2. **Macrosiphonia brachysiphon** A. Gray, Syn. Fl. **2**^{1}: 83. 1878.
Northern Sonora, near the boundary. Southern Arizona.

Plants suffrutescent, 60 cm. high or less, puberulent; leaves oblong to broadly elliptic, 2 to 3 cm. long, acute to rounded at apex; flowers fragrant; corolla white, the tube 2.5 to 5 cm. long; follicles 6 cm. long or more.

3. **Macrosiphonia macrosiphon** (Torr.) Heller, Muhlenbergia **1**: 2. 1900.
Echites macrosiphon Torr. U. S. & Mex. Bound. Bot. 158. *pl. 43*. 1859.
Macrosiphonia berlandieri A. Gray, Syn. Fl. **2**^{1}: 83. 1878.

Chihuahua to Tamaulipas, San Luis Potosí, and Durango. Western Texas; type collected along the Rio Grande.

Low shrub; leaves short-petiolate, mostly oval, 2 to 4 cm. long, acute to rounded at apex, truncate or rounded at base, tomentulose or glabrate above; flowers white, sweet-scented; corolla limb 4.5 to 6 cm. wide; follicles 6 to 10 cm. long. "Flor de San Juan" (Durango, Coahuila); "hierba de San Juan" (Coahuila, Tamaulipas).

4. **Macrosiphonia hypoleuca** (Benth.) Muell. Arg. Linnaea **30**: 452. 1860.
Echites hypoleuca Benth. Pl. Hartw. 23. 1839.
Echites suaveolens Mart. & Gal. Bull. Acad. Brux. **11**: 356. 1844.
Echites lanuginosa Mart. & Gal. Bull. Acad. Brux. **11**: 357. 1844.
Macrosiphonia lanuginosa Hemsl. Biol. Centr. Amer. Bot. **2**: 316. 1881.

Sinaloa to Chihuahua, San Luis Potosí, Hidalgo, and Puebla; type from Aguascalientes.

Shrub, 1 meter high or less; leaves linear to oblong-ovate, 2.5 to 7 cm. long, rounded to acute at apex, green above but puberulent, the margins often revolute; flowers white, very sweet-scented; corolla limb usually 6 to 7 cm. wide; follicles 9 to 16 cm. long. "Flor de San Juan" (Sinaloa, Guanajuato, San Luis Potosí, Jalisco, Durango); "rosa de San Juan" (Sinaloa, Oaxaca, Guerrero, Durango); "güirambo" (Guerrero); "hierba de la cucaracha" (San Luis Potosí); "San Juan" (Durango); "maravilla silvestre" (Sinaloa).

The pulverized plant, mixed with sugar, is said to be useful for poisoning cockroaches. Palmer reports that in San Luis Potosí and Durango a decoction of the plant is employed for pains in the stomach, toothache (applied hot to the tooth), and externally for inflamed eyes.

The species shows great variation in size of flowers and in leaf breadth, but the leaves vary greatly upon the same plant, the lower being often much broader than the upper ones.

15. RHABDADENIA Muell. Arg. in Mart. Fl. Bras. 6^{1}: 173. 1860.

Scandent shrubs; leaves opposite, petiolate; flowers large, in few-flowered racemes; calyx 5-parted, eglandular; corolla funnelform, the tube cylindric, the throat long-campanulate; anthers oblong, obtuse, short-appendaged at base; follicles terete, linear-fusiform; seeds with a terminal tuft of hairs.

Leaves oblong, acute or acutish at base; calyx lobes oblong to oval, obtuse.
1. R. paludosa.
Leaves elliptic, rounded or subcordate at base; calyx lobes ovate, acuminate.
2. R. cordata.

1. Rhabdadenia paludosa (Vahl) Miers, Apocyn. S. Amer. 119. 1878.
Echites paludosa Vahl, Eclog. Amer. **2**: 19. *pl. 5.* 1798.
Yucatán. Southern Florida, West Indies, and South America.
Stout woody vine, glabrous throughout; leaves 4.5 to 10 cm. long, obtuse or rounded at apex, leathery; calyx 6 to 9 mm. long; corolla 6 to 7 cm. long, white or pale yellow. "Clavelitos de sabana," "clavelitos de manglar" (Cuba).
The acrid juice is said to produce blisters upon the skin, and to have purgative and even poisonous properties.

2. Rhabdadenia cordata (Mill.) Miers, Apocyn. S. Amer. 122. 1878.
Apocynum cordatum Mill. Gard. Dict. ed. 8. *Apocynum* no. 10. 1768.
Tamaulipas and Veracruz; type from Veracruz.
Stout vine; leaves 5 to 11 cm. long, acute or abruptly short-acuminate, leathery, sparsely pubescent or glabrate; racemes few-flowered; corolla yellow, 6 to 7 cm. long; follicles divaricate, about 11 cm. long and 6 mm. thick.

16. UECHITES Muell. Arg. Bot. Zeit. 18: 22. 1860.

Scandent shrubs; leaves opposite; flowers large, racemose; calyx 5-parted, glandular within, the lobes narrow; corolla funnelform, the tube slender, terete, the throat campanulate, the lobes short; anthers sagittate, bearing at the apex a long filiform twisted appendage; follicles terete, erect or divergent; seeds with an apical tuft of hairs.

Leaves densely velutinous-pilosulous beneath; calyx 2 to 3 mm. long.
1. U. karwinskii.
Leaves glabrate or sparsely pubescent beneath; calyx 5 to 6 mm. long.
2. U. andrieuxii.

1. Urechites karwinskii Muell. Arg. Linnaea **30**: 440. 1860.
Mandevilla potosina T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 276. 1912.
Guerrero to San Luis Potosí, Veracruz, and Oaxaca; type from "Huefulta" (Huejutla, Hidalgo?). Guatemala.
Leaves petiolate, ovate-oblong to oval-elliptic, 5 to 10 cm. long, acuminate or abruptly short-acuminate, rounded or subcordate at base, sometimes panduriform; corolla white, 3.5 to 5.5 cm. long, the tube very slender; follicles about 12 cm. long. "Loroco" (Guatemala, El Salvador); "quilite" (El Salvador).
The flowers, buds, and young tender shoots are used as a vegetable in Guatemala and El Salvador, being cooked with rice and other substances.

2. Urechites andrieuxii Muell. Arg. Linnaea **30**: 442. 1860.
Type collected near Tehuantepec, Oaxaca; reported also from Hidalgo.
Leaves petiolate, broadly elliptic or elliptic-ovate, 5 to 6 cm. long, abruptly short-acuminate, rounded at base, glabrous above; corolla 5 cm. long; follicles 17 cm. long and 6 mm. thick.

17. MANDEVILLA Lindl. Bot. Reg. *pl.* 7. 1840.

Scandent shrubs; leaves opposite; flowers small or large, racemose, usually white; calyx 5-parted, glandular within; corolla funnelform, the tube cylindric, the throat campanulate; anthers obtuse or short-acuminate, appendaged at base; follicles erect or nearly so; seeds with an apical tuft of hairs.

The Mexican species are poorly represented in herbaria, and the following treatment is chiefly a mere compilation.

Corolla 12 to 14 mm. long----------1. M. andrieuxii.
Corolla 2 cm. long or larger.
  Leaves subsessile----------2. M. foliosa.
  Leaves petiolate.
    Leaves tomentose beneath----------3. M. convolvulacea.
    Leaves hirtellous or glabrous beneath----------4. M. oaxacana.

1. **Mandevilla andrieuxii** (Muell. Arg.) Hemsl. Biol. Centr. Amer. Bot. 2: 316. 1881.

Amblyanthera andrieuxii Muell. Arg. Linnaea 30: 422. 1860.

Type collected at San Francisco, between Huauapan and Oaxaca.

Leaves short-petiolate, narrowly obovate or obovate-lanceolate, 2 to 3 cm. long, subacute at base and apex, soft-pubescent beneath; calyx lobes ovate-lanceolate.

2. Mandevilla foliosa (Muell. Arg.) Hemsl. Biol. Centr. Amer. Bot. 2: 316. 1881.

Amblyanthera foliosa Muell. Arg. Linnaea 30: 427. 1860.

Type collected near the City of Mexico.

Leaves obovate, 9 to 12 cm. long, acuminate, cordate at base, glabrate above, hirtellous beneath along the nerves; corolla 2 cm. long.

3. **Mandevilla convolvulacea** (A. DC.) Hemsl. Biol. Centr. Amer. Bot. 2: 316. 1881.

Echites convolvulacea A. DC. in DC. Prodr. 8: 451. 1844.

Leaves oval, 7.5 to 10 cm. long, acuminate, obtuse or cordate at base, glabrate above; corolla tube 12 mm. long.

4. Mandevilla oaxacana (A. DC.) Hemsl. Biol. Centr. Amer. Bot. 2: 316. 1881.

Echites oaxacana A. DC. in DC. Prodr. 8: 451. 1844.

Echites glaucescens Mart. & Gal. Bull. Acad. Brux. 11: 358. 1844.

Mesechites hirtellula Miers, Apocyn. S. Amer. 234. 1878.

Mandevilla schumanniana Loesener, Bull. Herb. Boiss. 2: 556. 1894.

Oaxaca.

Scandent shrub; leaves lance-oblong to oblong-ovate, 4 to 6.5 cm. long, acute or acuminate, rounded or subcordate at base, scaberulous or glabrate above; corolla 2.5 to 3 cm. long, the tube slightly shorter than the throat.

DOUBTFUL SPECIES.

MANDEVILLA KARWINSKII (Muell. Arg.) Hemsl. Biol. Centr. Amer. Bot. 2: 316. 1881. *Amblyanthera karwinskii* Muell. Arg. Linnaea 30: 426. 1860. Type from Mexico. The description strongly suggest *Echites coulteri*.

18. HAPLOPHYTON A. DC. in DC. Prodr. 8: 412. 1844.

The genus consists of a single species.

1. **Haplophyton cimicidum** A. DC. in DC. Prodr. 8: 412. 1844.

Sonora and Chihuahua to Veracruz and Chipas; type from Tehuantepec, Oaxaca. Guatemala; Cuba; southern Arizona.

Plants slender, herbaceous or woody below, usually 30 to 60 cm. high, the stems puberulent; leaves opposite, short-petiolate, ovate or lanceolate, 3 to 5 cm. long, long-acuminate, rounded at base, hispidulous; flowers few, terminal, pedicellate, yellow; calyx eglandular, 5-parted, the lobes linear-subulate; corolla salverform, the lobes 12 to 15 mm. long, longer than the slender tube;

follicles very slender, 6 to 8 cm. long; seeds with deciduous hairs at each end. "Hierba de la cucaracha" (Oaxaca, Morelos); "raíz de la cucaracha" (Oaxaca); "atempatli" ("flea-medicine") or "actimpatli" (Nahuatl).

The plant is well known in Mexico as an insecticide. A decoction of the plant is mixed with cornmeal and used as a poison for cockroaches. The decoction is also applied as a lotion to the human body to kill all sorts of parasites and a lard ointment is employed for the same purpose. Flores states that a sweetened infusion of the plant will attract and kill mosquitoes.

19. ECHITES Jacq. Enum. Pl. Carib. 13. 1760.

Scandent shrubs; leaves opposite; flowers small or large, in axillary racemes; calyx 5-parted, glandular within; corolla salverform, the tube cylindric; anthers sagittate, appendaged at base; follicles slender, terete, often torulose; seeds with an apical tuft of silky hairs.

The following names are reported for plants which are said to belong to the genus: "Tijerilla" (Guanajuato); "raíz de cuculillo," "raíz de la cucaracha" (Oaxaca).

Leaves glabrous beneath.
- Corolla tube 6 to 12 mm. long.
  - Calyx lobes linear-lanceolate, one-third as long as the corolla tube or longer.
    - Corolla tube about 6 mm. long ---- **1. E. torosa.**
    - Corolla tube 10 to 12 mm. long ---- **2. E. smithii.**
  - Calyx lobes triangular, less than one-fifth as long as the corolla tube. **3. E. tuxtlensis.**
- Corolla tube 25 to 50 mm. long.
  - Calyx lobes obtuse ---- **4. E. trifida.**
  - Calyx lobes acute or acuminate.
    - Corolla tube about 5 cm. long ---- **5. E. umbellata.**
    - Corolla tube 2.5 to 3.5 cm. long.
      - Leaves thin, deeply emarginate at base ---- **11. E. microcalyx.**
      - Leaves coriaceous, rounded or subcordate at base ---- **6. E. rosea.**

Leaves variously pubescent beneath.
- Corolla lobes short, suberect, not spreading ---- **7. E. tubiflora.**
- Corolla lobes elongate, spreading.
  - Calyx lobes obtuse ---- **8. E. lanata.**
  - Calyx lobes acuminate.
    - Calyx lobes one-third as long as the corolla tube or longer.
      - Leaves mostly obtuse, acute or obtuse at base ---- **9. E. coulteri.**
      - Leaves acute or acuminate, usually subcordate at base. **10. E. apocynifolia.**
    - Calyx lobes less than one-fourth as long as the corolla tube.
      - Flowers 2.5 to 3.5 cm. long ---- **11. E. microcalyx.**
      - Flowers about 1.5 cm. long ---- **12. E. mexicana.**

1. Echites torosa Jacq. Enum. Pl. Carib. 13. 1760.

Yucatán and Campeche. West Indies; type from Jamaica.

Scandent shrub, glabrous throughout; leaves short-petiolate, lance-oblong, 3.5 to 4.5 cm. long, acute, obtuse or rounded at base, coriaceous; corolla yellow; follicles very slender, about 14 cm. long, torulose.

The juice is said to be poisonous and to have emetic-cathartic properties.

2. Echites smithii Greenm. Proc. Amer. Acad. **40**: 29. 1904.

Oaxaca; type from Salomá, altitude 1,980 meters.

Stems puberulent; leaves short-petiolate, oblong-lanceolate, 3 to 6 cm. long, acute, subcordate at base, glabrous or puberulent above, glabrous beneath; racemes short, 1 to 3-flowered; calyx 4 to 5 mm. long; corolla yellow, glabrous; follicles pubescent.

3. Echites tuxtlensis Standl., sp. nov.

Type from Tuxtla, Chiapas, altitude 720 to 840 meters (*Nelson* 3080; U. S. Nat. Herb. no. 234032).

Stems glabrous; leaves short-petiolate, the petioles puberulent, the blades lance-oblong or linear-oblong, 5 to 10 cm. long, 0.8 to 2.5 cm. wide, acute or acuminate, acute at base, thick, pale, glabrous, the lateral nerves obsolete beneath; racemes slender, few-flowered, longer than the leaves, glabrous, the flowers long-pedicellate; calyx lobes triangular, acute, 1 to 1.5 mm. long; corolla tube 8 mm. long, the lobes 4 to 5 mm. long.

4. Echites trifida Jacq. Enum. Pl. Carib. 13. 1760.

Oaxaca. Central America and northern South America; type from Cartagena, Colombia.

Scandent glabrous shrub; leaves petiolate, elliptic-oblong or oval-elliptic, 6 to 11 cm. long, acute or short-acuminate, rounded or obtuse at base; calyx 5 to 6 mm. long; corolla purplish, the tube 2.5 to 3 cm. long; follicles slender, 30 to 35 cm. long, not torulose.

5. Echites umbellata Jacq. Enum. Pl. Carib. 13. 1760.

Yucatán and perhaps elsewhere. West Indies.

Leaves petiolate, ovate to oval, 4.5 to 10 cm. long, rounded or abruptly short-acuminate at apex, rounded at base, thick; racemes few-flowered; corolla white or pale yellow; follicles rather stout, 15 to 21 cm. long.

6. Echites rosea A. DC. in DC. Prodr. **8**: 450. 1844.

Reported from San Luis Potosí, perhaps erroneously. Cuba.

Glabrous vine; leaves ovate-lanceolate, 1 to 2.5 cm. long, acuminate, subsessile; peduncles 2 or 3-flowered; corolla purplish, with slender tube; follicles about 7.5 cm. long.

7. Echites tubiflora Mart. & Gal. Bull. Acad. Brux. **11**: 358. 1844.

Jalisco to Veracruz, Morelos, and Michoacán; type from Jalapa, Veracruz. Guatemala.

Leaves petiolate, lance-oblong to elliptic, 4 to 9 cm. long, acute or short-acuminate, cordate at base, pilosulous or densely whitish-tomentose beneath; racemes secund, usually many-flowered; corolla 12 to 18 mm. long.

8. Echites lanata Mart. & Gal. Bull. Acad. Brux. **11**: 359. 1844.

Type from Sola, Oaxaca, altitude 1,200 meters.

Stems pubescent; leaves sessile, obovate, coriaceous, acuminate, cordate at base, lanate beneath; racemes longer than the leaves; flowers about 2.5 cm. long.

9. Echites coulteri S. Wats. Proc. Amer. Acad. **18**: 113. 1883.

Coahuila to San Luis Potosí and Hidalgo; type from the Sierra Madre south of Saltillo, Coahuila.

Plants scandent or suberect; leaves oblong-obovate to oval-elliptic, 2 to 4.5 cm. long, usually rounded at apex but often apiculate, sometimes emarginate, acute to rounded at base, pilosulous or puberulent beneath or finally glabrate; corolla tube about 1 cm. long; follicles 5 to 10 cm. long, torulose.

10. Echites apocynifolia A. Gray, Proc. Amer. Acad. **22**: 435. 1887.

Jalisco to Oaxaca; type from Río Blanco, Jalisco.

Plants suberect, puberulent; leaves short-petiolate, ovate-lanceolate to elliptic, acute or obtuse, glabrate in age; racemes few-flowered; corolla yellow, the tube 1 cm. long; follicles torulose.

11. Echites microcalyx A. DC. in DC. Prodr. **8**: 456. 1844.

Echites secundiflora A. DC. in DC. Prodr. **8**: 457. 1844.

Echites jasminiflora Mart. & Gal. Bull. Acad. Brux. **11**: 357. 1844.

Sinaloa to Veracruz, Tabasco, and Chiapas. Central America and northern South America; type from Caracas, Venezuela.

Scandent shrub; leaves short-petiolate, oblong to ovate-elliptic or obovate, 3 to 7 cm. long, acute or acuminate, cordate or hastate at base, pilosulous beneath or rarely glabrous, thin; racemes few or many-flowered; corolla yellow; follicles 8 to 20 cm. long, very slender, conspicuously torulose. "Flor del mico" (Guatemala, Honduras).

12. Echites mexicana (Muell. Arg.) Miers, Apocyn. S. Amer. 205. 1878.

Amblyanthera mexicana Muell. Arg. Linnaea **30**: 424. 1860.

Type from "Victoria."

Leaves ovate-lanceolate, 4 to 5 cm. long, acuminate, cordate at base, pubescent; racemes few-flowered.

DOUBTFUL SPECIES.

ECHITES ASPERA Mart. & Gal. Bull. Acad. Brux. **11**: 359. 1844. Type from Río de las Vueltas, Oaxaca.

ECHITES CORDATA A. DC. in DC. Prodr. **8**: 451. 1844. Based upon one of Sessé and Mociño's drawings[1] of a Mexican plant.

ECHITES PANDURATA A. DC. in DC. Prodr. **8**: 458. 1844. Type from San Dionisio, Oaxaca.

20. STREPTOTRACHELUS Greenm. Proc. Amer. Acad. 32: 298. 1897.

The genus consists of a single species.

1. Streptotrachelus pringlei Greenm. Proc. Amer. Acad. **32**: 298. 1897.

Morelos and Guerrero; type from Cuernavaca, Morelos, altitude 1,560 meters.

Large woody vine; leaves opposite, slender-petiolate, oblong-ovate to ovate-elliptic, 4 to 8 cm. long, short-acuminate, rounded or subcordate at base, puberulent; flowers greenish yellow or purplish, in axillary pedunculate cymes; calyx 5-parted, puberulent, eglandular, about 4 mm. long, the lobes lance-linear; corolla salverform, the tube about 2 cm. long, twisted; anthers sagittate, acuminate, appendaged at base; follicles 20 to 30 cm. long, slender, torulose; seeds with an apical tuft of soft hairs.

21. SECONDATIA DC. Prodr. 8: 445. 1844.

Secondatia difformis (Walt.) Benth. & Hook., a United States species, has been reported from Nuevo León, but probably incorrectly. At least a part of the specimens so labeled belong to the genus *Echites*.

1. Secondatia stans (A. Gray) Standl.

Trachelospermum stans A. Gray, Proc. Amer. Acad. **21**: 394. 1886.

Sinaloa to Chihuahua, Querétaro, Guanajuato, and Michoacán; type from the city of Chihuahua.

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[1] DC. Calq. Dess. Fl. Mex. *pl. 796.*

Shrub, erect or nearly so, about a meter high; leaves opposite, petiolate, elliptic to ovate or oblong, 6 to 12 cm. long, abruptly acuminate, rounded at base, puberulent or glabrate beneath; flowers pale yellow, in lax axillary bifid cymes; calyx lobes lance-linear; corolla salverform, glabrous, the tube 10 to 15 mm. long; follicles slender, torulose, 7 to 13 cm. long; seeds with an apical tuft of long silky hairs. "Hierba de la cucaracha" (Durango, Sinaloa, Michoacán).

The flowers are sweet-scented. The plant is used for poisoning cockroaches.

141. ASCLEPIADACEAE. Milkweed Family.

Plants erect or scandent, herbaceous or woody, with milky juice; leaves opposite, rarely verticillate or alternate, entire, estipulate; flowers perfect, regular, usually in cymes, these commonly umbelliform or racemiform; calyx inferior, the tube very short or none; corolla gamopetalous, rotate, campanulate, urceolate, or rarely funnelform or salverform, 5-lobate; corona usually present, adnate to the corolla or to the stamen tube, variously modified; stamens 5, the filaments usually short and connate; anthers basifixed, connivent about the stigma, forming with that and the filaments the gynostegium, 2-celled, the cells usually produced below, the connective often with a membrane at apex; pollen usually coherent in masses known as pollinia; 5 small corpuscles present on the margin of the disk between the anthers, these attached to the pollinia and supporting them after dehiscence of the anthers; ovary of 2 distinct carpels; stigma usually forming a 5-angulate disk; fruit of 2 follicles, one of these usually abortive, sessile, dehiscent; seeds often with a terminal tuft of hairs.

A large family, characterized by flowers of extremely complicated structure. A few genera represented only by herbaceous species occur in Mexico.

Pollen granular; corolla funnelform, 5 to 7 cm. long, pink or purplish. Scandent shrub, glabrous or nearly so ..... 1. **CRYPTOSTEGIA.**

Pollen waxy; corolla never funnelform, smaller.

Pollinia borne in the lower part of the anther cell, pendulous from the arms of the corpuscles.

Plants erect ..... 2. **ASCLEPIAS.**

Plants scandent.

Corona none ..... 3. **ASTEPHANUS.**

Corona present.

Corona adnate to the corolla.

Corona simple; corolla with a distinct tube ..... 4. **MACROSCEPIS.**

Corona double; corolla rotate.

Outer corona thin, entire or nearly so ..... 5. **FUNASTRUM.**

Outer corona fleshy, 5-lobate ..... 6. **FISCHERIA.**

Corona adnate to the gynostegium.

Corolla lobes valvate in bud.

Corona scales thin, flat ..... 7. **METASTELMA.**

Corona scales cucullate ..... 8. **BLEPHARODON.**

Corolla lobes contorted.

Leaves not cordate at base, usually linear to lanceolate, sometimes ovate.

Corona deeply lobate; stigma rostrate ..... 9. **BASISTELMA.**

Corona shallowly lobate; stigma conic ..... 10. **CYNANCHUM.**

Leaves ovate-cordate.
Corolla campanulate----------11. **MELLICHAMPIA.**
Corolla rotate or nearly so.
Corolla about 2 cm. long, the lobes linear.
12. OXYPETALUM.
Corolla much smaller, the lobes broader than linear.
13. ROULINIELLA.
Pollinia borne in the upper part of the anther cell, erect or divaricate from the arms of the corpuscles.
Anther cells longitudinally dehiscent; pollinia erect or nearly so.
Plants erect----------14. **NEPHRADENIA.**
Plants scandent----------15. **MARSDENIA.**
Anther cells transversely dehiscent; pollinia usually horizontal.
Corolla lobes with long barbate filiform terminal appendages.
16. TRICHOSACME.
Corolla lobes not appendaged.
Corolla campanulate or salverform.
Corolla short-salverform----------17. **LACHNOSTOMA.**
Corolla broadly campanulate.
Corolla long-hirsute within----------18. **MICRODACTYLON.**
Corolla not hirsute within.
Corona lobes adnate to the corolla------19. **DICTYANTHUS.**
Corona lobes free from the corolla------20. **POLYSTEMMA.**
Corolla rotate.
Stigma produced into a column----------21. **ROTHROCKIA.**
Stigma plane or depressed.
Corona entire or 5-lobate, the lobes not with lateral appendages----------22. **VINCETOXICUM.**
Corona with 10 or more lobes, or the outer lobes with filiform lateral appendages.
Corolla covered within with linear-spatulate hairs; corona of 15 scales----------23. **HIMANTOSTEMMA.**
Corolla lanate in the throat; corona of 10 scales.
24. UROSTEPHANUS.

1. **CRYPTOSTEGIA** R. Br. in Lindl. Bot. Reg. *pl. 435.* 1819.

1. Cryptostegia grandiflora (Roxb.) R. Br. in Lindl. Bot. Reg. *pl. 435.* 1819.
Nerium grandiflorum Roxb. Hort. Beng. 19. 1814.

Thoroughly naturalized in Sinaloa. Native of India.

Woody vine, glabrous or nearly so; leaves petiolate, oval to elliptic-ovate, 4.5 to 10 cm. long, obtuse or abruptly short-pointed, leathery; flowers few, in terminal cymes, pink or purplish; calyx 5-parted, the lobes lanceolate; corolla funnelform, 5 to 7 cm. long; carpels divaricate, about 12 cm. long and 3.5 cm. thick, acutely 3-angulate. "Clavel de España," "hiedra," "cuaumecate chayote" (Sinaloa).

The milky juice yields rubber, and the plant has been cultivated in some regions on that account. The rubber is said to be of good quality, but it is produced only in small amounts. The stems are said to yield a good quality of fiber. *Cryptostegia madagascariensis* Bojer, of Madagascar, the only other species, is reported to be an important source of rubber, and its bark furnishes a useful fiber.

2. ASCLEPIAS L. Sp. Pl. 214. 1753.

Shrubs or usually herbs; leaves opposite, verticillate, or alternate; flowers in terminal or axillary umbels; calyx 5-parted; corolla 5-parted, the lobes valvate, reflexed in anthesis; corona of 5 concave erect scales, each with a terminal incurved hornlike terminal appendage; follicles usually smooth; seeds with a terminal tuft of hairs.

Numerous herbaceous species of milkweed occur in Mexico.

Stems densely leafy, the leaves mostly scattered----------1. **A. linaria.**
Stems naked or nearly so except when young, the leaves opposite or verticillate.
Corona scales 3 mm. long or less----------2. **A. albicans.**
Corona scales 6 to 7 mm. long----------3. **A. subulata.**

1. Asclepias linaria Cav. Icon. Pl. 1: 42. *pl.* 57. 1791.

Jalisco to Chihuahua, Veracruz, and Oaxaca.

Stems herbaceous or more commonly woody, whitish-pubescent; leaves narrowly linear, 1 to 4 cm. long, glabrate; umbels axillary, pedunculate; flowers green and white, the corona scales 2.5 to 3 mm. long; follicles ovoid or narrowly ovoid, 3.5 to 6 cm. long, glabrous. "Romerillo" (Mexico, Aguascalientes, San Luis Potosí); "plumerillo" (Aguascalientes); "torbisco" (Durango); "mapipitza" (Mexico, San Luis Potosí, *Ramírez*); "Solimán" (Mexico); "teperomero" (Mexico); "tlalayote" (San Luis Potosí, Mexico, *Urbina*); "venenillo" (Mexico, San Luis Potosí); "algodoncillo," "hierba de la punzada" (Durango).

The juice is used locally as a drastic purgative, but its use is dangerous. Palmer reports that in Durango the leaves are applied to the temples to relieve headache.

2. Asclepias albicans S. Wats. Proc. Amer. Acad. 24: 59. 1889.

Baja California and Sinaloa; type from Los Angeles Bay, Baja California.

Stems numerous, often woody below, sometimes 3 meters high, whitish, puberulent when young; leaves opposite or ternate, linear, quickly deciduous; corolla greenish white tinged with brown, the corona scales yellowish; follicles slender, about 10 cm. long.

3. Asclepias subulata Decaisne in DC. Prodr. 8: 571. 1844.

Baja California, Sonora, and Sinaloa. Southern California and Arizona.

Stems numerous, about 1 meter high, usually woody below, glabrous or nearly so, glaucous; leaves narrowly linear but quickly deciduous; pedicels puberulent; corolla greenish white; follicles slender, 10 to 12 cm. long. "Yamete" (Baja California); "yumete" (Sonora); "candelilla bronca" (Sinaloa).

The milky juice is sometimes employed as an emetic and purgative.

3. ASTEPHANUS R. Br. Mem. Wern. Soc. 1: 54. 1809.

1. Astephanus pubescens Greenm. Proc. Amer. Acad. 32: 299. 1897.

Morelos and Mexico; type collected near Cuernavaca, Morelos, altitude 1,950 meters.

Slender suffrutescent vine, the stems pubescent; leaves petiolate, lanceolate or ovate-lanceolate, 1.5 to 6 cm. wide, acuminate, obtuse at base, pubescent; inflorescence subumbellate, few-flowered, the peduncles 1 to 2 mm. long, the pedicels about 3 mm. long; calyx minute, 5-parted, pubescent; corolla subcampanulate, about 3 mm. broad, white or purplish, the lobes emarginate.

4. MACROSCEPIS H. B. K. Nov. Gen. & Sp. 3: 200. 1819.

Stems scandent, suffrutescent, setose-hirsute; leaves cordate; cymes usually subsessile, the flowers large; calyx 5-lobate, eglandular; corolla short-salver-form, the tube ovoid or campanulate, constricted in the throat, the lobes spreading, contorted in bud; corona adnate to the corolla tube, composed of 5 fleshy inflexed subexserted scales; stigma plane or umbonate; follicles fleshy; seeds with an apical tuft of hairs.

Sepals acuminate----------1. M. obovata.
Sepals obtuse----------2. M. rotata.

1. Macroscepis obovata H. B. K. Nov. Gen. & Sp. 3: 201. *pl. 133.* 1819.

San Luis Potosí to Oaxaca, Chiapas, Veracruz, and Campeche; type from Campeche.

Stems fulvous-hirsute; leaves obovate to rounded-obovate, 6 to 17 cm. long, abruptly short-acuminate, deeply cordate at base, hirsute, especially beneath; cymes sessile, few-flowered, the flowers pedicellate; sepals hirsute and ciliate; corolla 2 to 2.5 cm. broad, hirtellous or glabrate outside, glabrous within, the lobes obtuse.

2. Macroscepis rotata Decaisne in DC. Prodr. 8: 599. 1844.

Type from Yucatán.

Leaves obovate, short-acuminate, cordate at base; peduncles short, 2 or 3-flowered; sepals ovate; corolla subrotate, the lobes ovate, obtuse.

Perhaps only a form of *M. obovata.* Decaisne states that the sepals are only half as long as in the latter species.

5. FUNASTRUM Fourn. Ann. Sci. Nat. VI. 14: 388. 1882.

Plants scandent, herbaceous or fruticose; leaves petiolate; flowers white or purplish, in axillary umbel-like cymes; calyx small, 5-parted; corolla subrotate, 5-lobate, the lobes contorted; exterior corona annular, adnate to the corolla; interior corona of 5 broad fleshy scales; pollinia pendulous; follicles smooth, terete.

Leaves linear or, if broader, obtuse or acute at base (linear leaves sometimes cordate-hastate at base).
  Leaves crispate----------1. F. crispum.
  Leaves plane.
    Leaves linear, sometimes hastate-cordate.
      Corolla lobes obtuse or acute----------2. F. cumanense.
      Corolla lobes acuminate----------3. F. heterophyllum.
    Leaves lance-oblong to elliptic, obtuse at base----------4. F. clausum.
Leaves deltoid, ovate, or broader, conspicuously cordate at base.
  Leaves white-tomentose beneath.
    Leaves orbicular----------5. F. rotundifolium.
    Leaves ovate or elliptic----------6. F. pannosum.
  Leaves glabrous or pubescent beneath, never tomentose.
    Stems glabrous or nearly so----------7. F. cynanchoides.
    Stems densely pubescent.
      Umbels sessile or subsessile.
        Corolla lobes papillose within----------8. F. lindenianum.
        Corolla lobes not papillose within----------9. F. bicolor.

Umbels on conspicuous, usually long peduncles.
Corolla lobes acuminate----------10. **F. dumetorum.**
Corolla lobes obtuse.
Lobes of the inner corona ovate-triangular----------11. **F. bilobum.**
Lobes of the inner corona oval, very obtuse.
Corolla glabrous outside----------12. **F. elegans.**
Corolla pubescent----------13. **F. torreyi.**

1. **Funastrum crispum** (Benth.) Schlechter, Repert. Sp. Nov. Fedde **13**: 284. 1914.

Sarcostemma crispum Benth. Pl. Hartw. 291. 1841.
Sarcostemma undulatum Torr. U. S. & Mex. Bound. Bot. 161. 1859.
Philibertia crispa Hemsl. Biol. Centr. Amer. Bot. **2**: 318. 1881.
Philibertella crispa Vail, Bull. Torrey Club **24**: 306. 1897.

Type from Aguascalientes. Western Texas to southern Arizona.

Stems chiefly herbaceous, glabrous or puberulent; leaves linear or lanceolate, 5 to 7 cm. long, attenuate, hastate-cordate at base, pale beneath; umbels pedunculate, few-flowered; corolla dull purple, glabrous within, puberulent outside, the lobes obtuse; follicles 10 to 12 cm. long.

No Mexican specimens have been seen by the writer.

2. **Funastrum cumanense** (H. B. K.) Schlechter, Repert. Sp. Nov. Fedde **13**: 284. 1914.

Sarcostemma cumanense H. B. K. Nov. Gen. & Sp. **3**: 195. 1819.
Sarcostemma arenarium Benth. Bot. Voy. Sulph. 34. 1844.
Philibertia cumanensis Hemsl. Biol. Centr. Amer. Bot. **2**: 218. 1881.

Baja California to Colima, Oaxaca, and Tabasco. Central America and northern South America; type from Cumaná, Venezuela.

Stems suffrutescent, or thick and woody at base, pilosulous or glabrate; leaves linear, 3 to 5.5 cm. long, short-petiolate, obtuse or acute at base, glabrate; umbels pedunculate; corolla 10 to 12 mm. broad, sericeous or puberulent outside. "Cuchamperrito," "bejuco de pescado" (El Salvador).

In El Salvador the tough stems are employed by the fishermen as cords on which to string fish.

3. **Funastrum heterophyllum** (Engelm.) Standl.

Sarcostemma lineare Decaisne; Benth. Pl. Hartw. 25. 1840. Not *S. lineare* Spreng. 1822.
Sarcostemma heterophyllum Engelm.; Torr. U. S. Rep. Expl. Miss. Pacif. **5**: 362. 1876.
Philibertia linearis A. Gray, Proc. Amer. Acad. **12**: 64. 1876.
Philibertella hartwegii Vail, Bull. Torrey Club **24**: 308. 1897.
Funastrum hartwegii Schlechter, Repert. Sp. Nov. Fedde **13**: 285. 1914.

Baja California to Chihuahua, Coahuila, Querétaro, and Jalisco. Western Texas to southern California; type from Fort Yuma, Arizona.

Slender vine, herbaceous or suffrutescent, glaucescent, pubescent or glabrate; leaves linear, 3 to 6 cm long, acute, obtuse, or cordate-hastate at base; umbels pedunculate, few or many-flowered; corolla purplish, 8 to 10 mm. broad, pubescent outside; follicles 6 to 10 cm. long, pubescent or glabrate. "Hortensia de guía" (Jalisco).

Said to be used in Sinaloa as a remedy for snake bites.

4. **Funastrum clausum** (Jacq.) Schlechter, Repert. Sp. Nov. Fedde **13**: 283. 1914.

Cynanchum clausum Jacq. Stirp. Amer. **1**: 87. 1763.
Sarcostemma crassifolium Decaisne in DC. Prodr. **8**: 540. 1844.

Philibertia crassifolia Hemsl. Biol. Centr. Amer. Bot. **2**: 318. 1881.
Philibertia palmeri A. Gray, Proc. Amer. Acad. **21**: 394. 1886.
Cynanchum mexicanum T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 380. 1913.
Funastrum crassifolium Schlechter, Repert. Sp. Nov. Fedde **13**: 284. 1914.
Funastrum palmeri Schlechter, Repert. Sp. Nov. Fedde **13**: 286. 1914.

Baja California to Chihuahua, Tamaulipas, Morelos, Tabasco, and Oaxaca. Florida, West Indies, Central America, and northern South America.

Stems herbaceous or suffrutescent, usually glabrous; leaves petiolate, 3 to 7 cm. long, acuminate or cuspidate, glabrous or often densely pubescent beneath; umbels long-pedunculate, many-flowered; flowers 10 to 14 mm. broad, whitish, sericeous outside; follicles 5 to 6.5 cm. long, about 1 cm. thick. "Petaquilla" (Tabasco); "bejuco de leche," "quichi-nixi" (Oaxaca, *Seler*); "mata-tórsalo" (Costa Rica).

In Costa Rica the crushed leaves are applied at the point in the skin where a larva of the dipterous insect known as "tórsalo" is located, and the latter is soon killed by the acrid juice.

5. **Funastrum rotundifolium** (Decaisne) Schlechter, Repert. Sp. Nov. Fedde **13**: 287. 1914.

Sarcostemma rotundifolium Decaisne in DC. Prodr. **8**: 540. 1844.
Philibertia rotundifolia Hemsl. Biol. Centr. Amer. Bot. **2**: 320. 1881.

Type from "Guasacualcos."

Leaves orbicular, abruptly acuminate, puberulent above, white-tomentose beneath; umbels long-pedunculate, many-flowered; corolla lobes acute, puberulent outside.

Probably not distinct from the next species.

6. **Funastrum pannosum** (Decaisne) Schlechter, Repert. Sp. Nov. Fedde **13**: 286. 1914.

Sarcostemma pannosum Decaisne in DC. Prodr. **8**: 540. 1844.
Philibertia pavoni Hemsl. Biol. Centr. Amer. Bot. **2**: 319. 1881.
Philibertia pannosa Hemsl. Biol. Centr. Amer. Bot. **2**: 320. 1881.
Funastrum pavoni Schlechter, Repert. Sp. Nov. Fedde **13**: 286. 1914.

Sonora to San Luis Potosí, Querétaro, and Oaxaca.

Stems herbaceous or frutescent, glabrate; leaves petiolate, 3 to 10 cm. long, acute, acuminate, or cuspidate, green above and puberulent, usually deeply cordate at base; umbels long-pedunculate, many-flowered; corolla white, 1.5 to 2 cm. broad, the lobes obtuse or subacute, puberulent outside. "Talayotillo" (Sinaloa).

7. **Funastrum cynanchoides** (Decaisne) Schlechter, Repert. Sp. Nov. Fedde **13**: 284. 1914.

Sarcostemma cynanchoides Decaisne in DC. Prodr. **8**: 540. 1844.
Philibertia cynanchoides A. Gray, Proc. Amer. Acad. **12**: 64. 1876.
Philibertella cynanchoides Vail, Bull. Torrey Club **24**: 207. 1897.

Sonora, Chihuahua, Coahuila, and Nuevo León; type from Matamoros, Coahuila. Western Texas to Arizona.

Stems chiefly herbaceous; leaves petiolate, deltoid-cordate or sagittate, 2.5 to 5.5 cm. long, acute or acuminate, usually glabrous; umbels many-flowered, long-pedunculate; corolla white, about 1 cm. broad, the lobes puberulent outside, ciliate, acute.

Philibertia cynanchoides subtruncata Robins. & Fern.[1], described from Fronteras, Sonora, is a form with narrow leaves which are mostly truncate at base.

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[1] Proc. Amer. Acad. **30**: 19. 1894.

8. **Funastrum lindenianum** (Deca'sne) Schlechter, Repert. Sp. Nov. Fedde 13: 286. 1914.

Sarcostemma lindenianum Decaisne in DC. Prodr. 8: 541. 1844.

Philibertia lindeniana Hemsl. Biol. Centr. Amer. Bot. 2: 318. 1881.

Type from Yucatán.

Stems pubescent; leaves cordate or subtruncate-cordate, rounded and short-cuspidate at apex, pubescent; pedicels about as long as the leaves; corolla lobes subobtuse.

9. **Funastrum bicolor** (Decaisne) Standl.

Sarcostemma bicolor Decaisne in DC. Prodr. 8: 541. 1844.

Philibertia bicolor A. Gray, Proc. Amer. Acad. 21: 395. 1886.

San Luis Potosí, Querétaro, Mexico, and Puebla; type from Tehuacán, Puebla.

Stems chiefly herbaceous; leaves petiolate, oblong-cordate or triangular-cordate, 2 to 5.5 cm. long, rounded and apiculate or cuspidate or long-acuminate, pubescent; umbels mostly few-flowered; corolla 2 to 2.5 cm. broad, greenish yellow and brownish purple, the lobes obtuse, puberulent outside, ciliate.

10. **Funastrum dumetorum** (T. S. Brandeg.) Standl.

Philibertia dumetorum T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 380. 1913.

Type from Baños del Carrizal, Veracruz.

Stems retrorse-pubescent; leaves orbicular-ovate, 5.5 cm. long or less, obtuse, acuminate, or emarginate, deeply cordate at base, pubescent; corolla lobes 5 mm. long.

Not seen by the writer.

11. **Funastrum bilobum** (Hook. & Arn.) Standl.

Sarcostemma bilobum Hook. & Arn. Bot. Beechey Voy. 438. 1841.

Type from Acapulco, Guerrero.

Plants glabrous; leaves cordate-ovate, 3.5 to 5 cm. long, acuminate; umbels many-flowered, the peduncles longer than the leaves.

12. **Funastrum elegans** (Decaisne) Schlechter, Repert. Sp. Nov. Fedde 13: 284. 1914.

Sarcostemma elegans Decaisne in DC. Prodr. 8: 541. 1844.

Philibertia elegans Hemsl. Biol. Centr. Amer. Bot. 2: 318. 1881.

Philibertia ervendbergii A. Gray, Proc. Amer. Acad. 21: 395. 1886.

Philibertella elegans Vail, Bull. Torrey Club 24: 310. 1897.

Funastrum ervendbergii Schlechter, Repert. Sp. Nov. Fedde 13: 285. 1914.

Veracruz, Hidalgo, Mexico, Oaxaca, Chiapas, and Yucatán; type collected near the City of Mexico.

Stems chiefly herbaceous; leaves long-petiolate, broadly ovate-cordate, 4 to 7 cm. long, rounded at apex and usually short-cuspidate, deeply cordate at base, pubescent; corolla white or greenish, about 1 cm. broad. "Biná" (Oaxaca, *Seler*).

13. **Funastrum torreyi** (A. Gray) Schlechter, Repert. Sp. Nov. Fedde 13: 287. 1914.

Philibertia torreyi A. Gray, Proc. Amer. Acad. 12: 64. 1876.

Philibertella torreyi Vail, Bull. Torrey Club 24: 309. 1897.

Chihuahua and Coahuila to Guanajuato. Western Texas.

Stems slender, densely pubescent; leaves lance-cordate, 2 to 4 cm. long, acuminate or long-acuminate, deeply cordate at base, thick, densely pubescent; corolla 1 to 2 cm. broad, white or purplish.

DOUBTFUL SPECIES.

FUNASTRUM LURIDUM (Decaisne) Schlechter, Repert. Sp. Nov. Fedde 13: 286. 1914. *Sarcostemma luridum* Kunze, Linnaea 20: 26. 1847; *Philibertia lurida* Hemsl. Biol. Centr. Amer. Bot. 2: 319. 1881. Described from cultivated plants of Mexican origin.

PHILIBERTIA TOMENTELLA T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 90. 1910. Type from the Cape Region of Baja California.

6. FISCHERIA DC. Cat. Hort. Monsp. 112. 1813.

Stems scandent, usually fruticose below; leaves cordate; cymes umbelliform or short-racemiform, pedunculate; calyx 5-parted, glandular within, the segments usually narrow; corolla subrotate, the lobes contorted in bud; outer corona annular, fleshy, adnate to the corolla, the interior corona of 5 fleshy obtuse scales; stigma depressed.

Calyx lobes obovate, obtuse; cymes short-pedunculate.
1. F. aristolochiaefolia.
Calyx lobes linear; cymes on long peduncles 2. F. oaxacana.

1. **Fischeria aristolochiaefolia** T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 190. 1915.

Type from Cerro del Boquerón, Chiapas.

Stems long-hirsute; leaves ovate-cordate or oblong-cordate, 6 to 16 cm. long, acuminate, hirsute beneath; peduncles 1.5 cm. long or less, about 6-flowered; calyx nearly glabrous; corolla about 7 mm. long.

2. **Fischeria oaxacana** Standl., sp. nov.

Type from Santo Domingo, Oaxaca, altitude 480 meters (*Nelson* 2713; U. S. Nat. Herb. no. 908027).

Stems stout, densely hirtellous and very sparsely hirsute; leaves petiolate, elliptic-ovate, 7.5 to 15 cm. long, 4 to 9 cm. wide, acute to rounded at apex and short-cuspidate, cordate at base with a short closed sinus, minutely setulose above, densely setulose-pilosulous beneath; peduncles 4.5 to 10 cm. long, many-flowered, the flowers short-racemose, the pedicels 1.5 to 2.5 cm. long, viscid-hirtellous and sparsely hirsute; calyx lobes about 1 cm. long, linear or narrowly oblong-lanceolate, cuspidate-attenuate; corolla about 1 cm. long, hirtellous outside, the lobes ovate-oblong, subacute, hirtellous within; outer corona fleshy, rugose, the scales of the inner corona large and very thick, abruptly contracted at about the middle, the upper portion broadly rounded.

7. METASTELMA R. Br. Mem. Wern. Soc. 1: 52. 1809.

Slender vines, herbaceous or suffrutescent; leaves small; cymes umbelliform, sessile or short-pedunculate, the flowers very small, whitish; calyx 5-lobate. usually minutely glandular within; corolla campanulate or subrotate, deeply 5-lobate, the lobes valvate, usually papillose or villous within; corona scales membranaceous, ovate to linear; stigma plane or apiculate; follicles terete, smooth.

Corolla lobes merely puberulent within.
Leaves subcordate at base 1. M. subcordatum.
Leaves obtuse or acute at base.
Calyx lobes subulate 2. M. schaffneri.
Calyx lobes ovate, obtuse.
Corolla lobes linear, glabrous within or nearly so 3. M. cuneatum.
Corolla lobes oblong, densely puberulent within.
Umbels long-pedunculate 4. M. macropodum.
Umbels sessile or nearly so 5. M. palmeri.

Corolla lobes villous or barbate within.
  Gynostegium distinctly stalked, the column about as long as the anthers.
    Leaves lance-linear----6. **M. multiflorum.**
    Leaves lance-oblong to oval.
      Umbels sessile or nearly so----7. **M. schlechtendahlii.**
      Umbels pedunculate----8. **M. pedunculare.**
  Gynostegium sessile or short-stipitate.
    Corolla lobes linear.
      Calyx lobes acuminate----9. **M. watsonianum.**
      Calyx lobes obtuse----10. **M. barbigerum.**
    Corolla lobes oblong or ovate.
      Corona scales lanceolate----11. **M. lanceolatum.**
      Corona scales linear or subulate.
        Flowers 1.5 mm. long or less----12. **M. latifolium.**
        Flowers 2 to 4 mm. long.
          Corona scales much exceeding the gynostegium----13. **M. pringlei.**
          Corona scales about equaling the gynostegium----14. **M. chiapense.**

1. **Metastelma subcordatum** Benth. Bot. Voy. Sulph. 33. *pl. 18.* 1844.
   Type from Magdalena Bay, Baja California.
   Slender vine, fruticose below, glabrous; leaves ovate-oblong, acuminate-mucronate; umbels subsessile, the pedicels glabrous; corolla lobes ovate; corona scales lanceolate, acutish, slightly longer than the sessile gynostegium.

2. **Metastelma schaffneri** A. Gray, Proc. Amer. Acad. **21**: 396. 1886.
   Type collected near San Luis Potosí.
   Stems glabrous; leaves lanceolate, obtuse at base; corolla lobes oblong-ovate; corona scales linear-subulate, exceeding the gynostegium.

3. **Metastelma cuneatum** T. S. Brandeg. Zoe **5**: 216. 1905.
   Type collected at Yerba Buena, near Altata, Sinaloa.
   Stems very slender, bifariously puberulent; leaves lanceolate, 1.5 to 3 cm. long, acuminate, obtuse or rounded at base; nearly glabrous; umbels 4 to 9-flowered, subsessile; corolla 2 mm. long, the lobes acute; corona scales minute.

4. **Metastelma macropodum** Greenm. Proc. Amer. Acad. **33**: 481. 1898.
   Puebla and Oaxaca; type from Tomellín Canyon, Oaxaca, altitude 1,540 meters.
   Stems slender, bifariously puberulent; leaves oblong-linear or linear-lanceolate, 1.5 to 2.5 cm. long, acute, obtuse at base, glabrous or nearly so; peduncles 3 to 18 mm. long; corolla 3 to 4 mm. long, yellowish white; corona scales about equaling the gynostegium.

5. **Metastelma palmeri** S. Wats. Proc. Amer. Acad. **18**: 115. 1883.
   Coahuila and San Luis Potosí. Western Texas; type from Laredo.
   Stems suffrutescent, slender; leaves linear-lanceolate or oblong-linear, 1 to 3 cm. long, acute, obtuse or acute at base, nearly glabrous; corolla about 2 mm. long; corona scales lanceolate, acuminate, slightly exceeding the gynostegium; follicles about 4.5 cm. long.

6. **Metastelma multiflorum** S. Wats. Proc. Amer. Acad. **25**: 158. 1890.
   Jalisco to Morelos and Oaxaca; type collected near Guadalajara.
   Stems glabrous or nearly so, suffrutescent below; leaves 1 to 3.5 cm. long, attenuate, obtuse at base, the upper ones much reduced; umbels sessile; flowers about 2 mm. long; calyx lobes acute or acuminate; corona lobes linear-lanceolate, exceeding the stigma.

7. Metastelma schlechtendahlii Decaisne in DC. Prodr. 8: 513. 1844.

Metastelma parviflorum Schlecht. Linnaea 6: 731. 1831. Not *M. parviflorum* R. Br. 1809.

Veracruz, Oaxaca, and Yucatán; type from Hacienda de la Laguna, Veracruz.

Stems slender, suffrutescent below, hirtellous or glabrate; leaves mostly oblong-ovate or oval, 1 to 3 cm. long, obtuse and mucronate, rounded or subcordate at base, glabrate; flowers about 3 mm. long; calyx lobes obtuse; corona scales linear-subulate, exceeding the gynostegium.

8. Metastelma pedunculare Decaisne in DC. Prodr. 8: 514. 1844.

Oaxaca. Guatemala and El Salvador; type from Cuesta de Pinula, Guatemala.

Stems bifariously puberulent; leaves slender-petiolate, ovate-lanceolate to oval, 1.5 to 3 cm. long, acute or mucronate, rounded or subcordate at base, nearly glabrous; flowers 2 to 3 mm. long, sweet-scented; corona scales ligulate. "Cuchamperrito," "cuchamper de zope," "ojo de pescado" (El Salvador).

9. Metastelma watsonianum Standl.

Metastelma albiflorum S. Wats. Proc. Amer. Acad. 24: 60. 1889. Not *M. albiflorum* Griseb. 1861.

Type from Guaymas, Sonora.

Stems puberulent or glabrate; leaves oblong or oblong-linear, 1 to 2 cm. long, acute or obtuse and mucronate; flowers white, about 4 mm. long; corona scales exceeding the anthers.

10. Metastelma barbigerum Scheele, Linnaea 21: 760. 1848.

Coahuila, Nuevo León, and Tamaulipas. Western Texas.

Stems puberulent or glabrate; leaves petiolate, lance-oblong to oval, 1 to 3 cm. long, acute at apex or rounded and apiculate, broadly rounded at base; umbels sessile or short-pedunculate; flowers 4 to 5 mm. long, white, sweet-scented; corona scales subulate. "Talayote" (Tamaulipas).

11. Metastelma lanceolatum Schlechter, Bull. Herb. Boiss. II. 6: 840. 1906.

Guerrero to San Luis Potosí and Chiapas; type from Zoquitlán. Distrito de Tlacolula, Oaxaca.

Stems puberulent or glabrate, woody below; leaves lanceolate to oblong or lance-linear, 1 to 3.5 cm. long, acute or obtuse, puberulent or glabrate; cymes few-flowered, sessile or nearly so; corolla 2 mm. long; follicles 6 cm. long.

12. Metastelma latifolium Rose, Contr. U. S. Nat. Herb. 1: 106. 1891.

Type from Alamos, Sonora.

Woody vine, the stems glabrous or nearly so; leaves oblong or lance-oblong, 1 to 2.5 cm. long, acute to rounded at apex, mucronate, obtuse or rounded at base, puberulent above; umbels sessile or short-pedunculate.

13. Metastelma pringlei A. Gray, Proc. Amer. Acad. 21: 396. 1886.

Chihuahua, Coahuila, and Durango; Baja California (?); type from Chihuahua.

Stems slender, fruticose below,. glabrous or nearly so; leaves linear or lance-linear, 1 to 3 cm. long, acute or obtuse, obtuse at base; umbels sessile or nearly so; calyx lobes obtuse; follicles 5 cm. long.

14. Metastelma chiapense A. Gray, Proc. Amer. Acad. 21: 397. 1886.

?*Metastelma sclerianum* Schlechter, Bull. Herb. Boiss. II. 6: 841. 1906.

Oaxaca and Chiapas; type from Chiapas.

Stems glabrous or nearly so; leaves linear, 1 to 5 cm. long, acute; umbels sessile, 3 to 6-flowered; calyx lobes obtuse.

Reported by Hemsley as *M. cubense* Decaisne.

8. BLEPHARODON Decaisne in DC. Prodr. 8: 603. 1844.

1. Blepharodon mucronatum (Schlecht.) Decaisne in DC. Prodr. 8: 603. 1844.

Astephanus mucronatus Schlecht. Linnaea 8: 518. 1833.

Philibertia anomala T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 277. 1912.

Blepharodon anomalum Schlechter, Repert. Sp. Nov. Fedde 13: 283. 1914.

San Luis Potosí and Veracruz to Oaxaca and Chiapas; type from Hacienda de la Laguna, Veracruz. Central America.

Glabrous vine, herbaceous or suffrutescent; leaves short-petiolate, oblong to elliptic, 2.5 to 7.5 cm. long, cuspidate, obtuse or rounded at base, pale beneath and with conspicuous venation, leathery; cymes pedunculate, umbel-like, the pedicels filiform; corolla rotate, about 1 cm. broad, the lobes lance-oblong, obtuse, glabrous outside, papillose within above, ciliate; corona lobes oval, obtuse, shorter than the gynostegium.

9. BASISTELMA Bartlett, Proc. Amer. Acad. 44: 631. 1909.

Plants scandent, herbaceous or suffrutescent; leaves linear or nearly so, short-petiolate; flowers small, axillary, solitary or in few-flowered cymes; calyx 5-lobate, the lobes narrow, acute; corolla campanulate, the lobes pilose within below the middle, dextrorsely contorted; corona lobes fleshy, lanceolate or triangular-subulate; pollinia pendulous; stigma produced into a cylindric beak.

Only the two following species are known.

Beak of stigma short; anther appendages recurved_____1. B. mexicanum.
Beak of stigma elongate; anther appendages not recurved_2. B. angustifolium.

1. Basistelma mexicanum (T. S. Brandeg.) Bartlett, Proc. Amer. Acad. 44: 632. 1909.

Melinia mexicana T. S. Brandeg. Zoe 5: 216. 1905.

Type from Cerro Colorado, Sinaloa.

Stems slender, sparsely pubescent; leaves narrowly linear, 2.5 cm. long; peduncles about 4-flowered, 3 mm. long; corolla 2.5 mm. long, the lobes linear; follicles 4 cm. long, 7 mm. thick, glabrous.

2. Basistelma angustifolium (Torr.) Bartlett, Proc. Amer. Acad. 44: 632. 1909.

Metastelma angustifolium Torr. U. S. & Mex. Bound. Bot. 159. 1859.

Melinia angustifolia A. Gray, Proc. Amer. Acad. 12: 73. 1877.

Pattalias angustifolius S. Wats. Proc. Amer. Acad. 24: 60. 1889.

Sonora; type from Santa Cruz. Southern Arizona.

Stems slender, glabrous or nearly so; leaves 2 to 4 cm. long, acute; peduncles 1 to 3-flowered, very short, the pedicels mostly shorter than the flowers; corolla 2.5 mm. long; follicles about 5 cm. long and 6 mm. thick, glabrous.

10. CYNANCHUM L. Sp. Pl. 212. 1753.

Plants scandent, herbaceous or suffrutescent, glabrous or pubescent; leaves petiolate or sessile; flowers small, in umbelliform cymes, yellowish green; calyx 5-parted, often glandular, the lobes acute or obtuse; corolla campanulate-rotate, the lobes contorted; corona attached to the stamen tube, shallowly lobate; pollinia pendulous; stigma conic; follicles smooth.

Leaves sessile.
Corolla 8 mm. long----1. C. peninsulare.
Corolla 3 mm. long----2. C. palmeri.
Leaves distinctly petiolate.
Leaves linear or lance-linear, 5 mm. wide or less----3. C. kunthii.
Leaves lanceolate or ovate, mostly 10 to 35 mm. wide.
Flowers about 3 mm. long----4. C. astephanoides.
Flowers 1.5 mm. long or less----5. C. sepium.

1. **Cynanchum peninsulare** Blake, Contr. Gray Herb. **52**: 83. 1917.
Type from the west coast of the Cape Region, Baja California.
Stems pubescent at the nodes; leaves linear, 3 to 8 cm. long, sparsely appressed-pubescent on the margins; umbels 2 to 7-flowered, subsessile, the pedicels 2 mm. long; corolla glabrous or nearly so; follicles glabrous, about 10 cm. long.

2. **Cynanchum palmeri** (S. Wats.) Blake, Contr. Gray Herb. **52**: 83. 1917.
Pattalias palmeri S. Wats. Proc. Amer. Acad. **24**: 60. 1889.
Type from Mulejé, Baja California.
Stems sparsely puberulent or glabrate; leaves linear, 1.5 to 5 cm. long, acute; umbels 2 to 6-flowered, sessile, the pedicels 2 to 3 mm. long; flowers yellow; follicles about 10 cm. long and 6 mm. thick.

3. **Cynanchum kunthii** (Decaisne) Standl.
Cynanchum lanceolatum H. B. K. Nov. Gen. & Sp. **3**: 203. 1819. Not *C. lanceolatum* Poir. 1811.
Orthosia kunthii Decaisne in DC. Prodr. **8**: 527. 1844.
Metastelma angustifolium Turcz. Bull. Soc. Nat. Moscou **1852**[2]: 315. 1852.
Vincetoxicum kunthii Hemsl. Biol. Centr. Amer. Bot. **2**: 328. 1881.
Vincetoxicum mexicanum S. Wats. Proc. Amer. Acad. **18**: 115. 1883.
Chihuahua to Veracruz, Oaxaca, and Durango. Type locality given doubtfully as "Nova Andalusia" (Venezuela), but this probably is incorrect.
Very slender vine, chiefly herbaceous, the stems bifariously puberulent or glabrous; leaves 1 to 5 cm. long, acute, glabrate; umbels few-flowered, sessile or short-pedunculate, the flowers about 2 mm. long; follicles slender, about 5.5 cm. long.

4. **Cynanchum astephanoides** (A. Gray) Standl.
Vincetoxicum astephanoides A. Gray, Proc. Amer. Acad. **22**: 435. 1887.
Type from barranca near Guadalajara, Jalisco.
Coarse woody vine; leaves long-petiolate, ovate or lance-ovate, 5 to 7.5 cm. long, acuminate, thin, puberulent; umbels short-pedunculate, several-flowered; corolla white, the lobes hairy within.

5. **Cynanchum sepium** (Decaisne) Standl.
Vincetoxicum sepium Decaisne in DC. Prodr. **8**: 526. 1844.
Type from mountains of Oaxaca; reported from Hidalgo. Guatemala.
Slender woody vine, the branches sparsely puberulent; leaves lanceolate or ovate-lanceolate, 2.5 to 5 cm. long, acuminate, rounded at base, thin, sparsely puberulent above; umbels pedunculate or subsessile, 4 to 6-flowered.

11. MELLICHAMPIA A. Gray, Proc. Amer. Acad. **22**: 437. 1887.

The genus consists of a single species.

1. **Mellichampia ligulata** (Benth.) Vail, Bull. Torrey Club **26**: 425. 1899.
Enslenia ligulata Benth. Pl. Hartw. 290. 1848.
Mellichampia rubescens A. Gray, Proc. Amer. Acad. **22**: 437. 1887.

Roulinia sinaloensis T. S. Brandeg. Zoe 5: 243. 1908.
Roulinia ligulata Pittier, Contr. U. S. Nat. Herb. 13: 111. 1910.
Sinaloa to Michoacán; type from Aguascalientes.

Slender vine, chiefly herbaceous, the stems glabrous or nearly so; leaves long-petiolate, ovate-cordate, 5 to 8.5 cm. long, acuminate, deeply cordate at base, thin, puberulent beneath along the nerves; cymes raceme-like or umbel-like, few-flowered; calyx lobes linear; corolla campanulate, 12 to 15 mm. long, purple, glabrous outside, pubescent within, the lobes lance-linear, recurved above; corona simple, tubular, the lobes ovate, caudate-attenuate, nearly equaling the corolla.

12. OXYPETALUM R. Br. Mem. Wern. Soc. 1: 41. 1809.

1. **Oxypetalum cordifolium** (Vent.) Schlechter in Urban, Symb. Ant. 1: 269. 1899.
Gothofreda cordifolia Vent. Choix Pl. Cels. 7. *pl. 60*. 1803.
Oxypetalum riparium H. B. K. Nov. Gen. & Sp. 3: 197. 1819.
San Luis Potosí, Veracruz, and Oaxaca. West Indies; Central and South America.

Plants scandent, herbaceous or suffrutescent; leaves long-petiolate, ovate-cordate, 6 to 10 cm. long, acuminate, deeply cordate at base, pubescent; cymes few-flowered, pedunculate, shorter than the leaves, the pedicels filiform; calyx lobes linear-lanceolate; corolla lobes narrowly linear, about 2 cm. long, puberulent; corona lobes oblong-ligulate, truncate.

13. ROULINIELLA Vail, Bull. Torrey Club 29: 662. 1902.

REFERENCE: Vail, Bull. Torrey Club 29: 662–668. 1902.

Plants scandent, herbaceous or fruticose, glabrous or puberulent; leaves cordate, long-petiolate, thin; cymes racemiform, the flowers whitish or greenish; calyx 5-parted, glandular within; corolla subrotate, the lobes contorted or subvalvate; corona scales connected by a membranceous ring, erect, acuminate or caudate; follicles smooth.

Corona scales not exceeding the stigma ..... 1. **R. unifaria.**
Corona scales much exceeding the stigma.
  Buds globose ..... 2. **R. palmeri.**
  Buds ovoid, pointed.
    Corona scales gradually narrowed into the terminal ligule .. 3. **R. lignosa.**
    Corona scales abruptly contracted into the terminal ligule ... 4. **R. foetida.**

1. **Rouliniella unifaria** (Scheele) Vail, Bull. Torrey Club 29: 663. 1902.
Gonolobus unifarius Scheele, Linnaea 21: 760. 1848.
Roulinia unifaria Engelm.; Torr. U. S. & Mex. Bound. Bot. 160. 1850.
Cynanchum racemosum T. S. Brandeg. Univ. Calif. Publ. Bot. 7: 331. 1920.
Nuevo León, Tamaulipas, and Veracruz. Western Texas; type from New Braunfels.

Stems slender, chiefly herbaceous, glabrous or nearly so; leaves deltoid to broadly ovate-cordate, 2.5 to 7 cm. long, acuminate, usually deeply cordate at base, glabrous; inflorescence equaling or exceeding the leaves, 7 to 12-flowered; buds globose; corolla white, 4 to 6 mm. long; corona scales obscurely 3-lobate; follicles 6 cm. long. "Talayote" (Tamaulipas).

2. **Rouliniella palmeri** (S. Wats.) Vail, Bull. Torrey Club 29: 664. 1902.
Roulinia palmeri S. Wats. Proc. Amer. Acad. 18: 115. 1883.
Coahuila; type from mountains northeast of Monclova.

Stems bifariously puberulent or glabrous; leaves deltoid-cordate, 3 to 8 cm. long, acute or acuminate, glabrous; peduncles equaling or shorter than the leaves, 5 to 9-flowered; corolla greenish white; follicles 5 to 10 cm. long.

3. **Rouliniella lignosa** Vail, Bull. Torrey Club **29**: 666. *f. 5.* 1902.

Jalisco to Morelos and Oaxaca; type from Río Blanco, Jalisco.

Stems glabrous or nearly so, often fruticose; leaves ovate-cordate or deltoid-cordate, 3.5 to 8.5 cm. long, acute or acuminate, truncate to deeply cordate at base, glabrous or nearly so; peduncles equaling or shorter than the leaves, few-flowered; corolla 5 to 6 mm. long; follicles about 9 cm. long.

4. **Rouliniella foetida** (Cav.) Vail, Bull. Torrey Club **29**: 667. 1902.

Asclepias foetida Cav. Icon. Pl. **2**: 45. *pl. 158.* 1793.

Roulinia jacquini Decaisne in DC. Prodr. **8**: 517. 1844.

Rouliniella jaliscana Vail, Bull. Torrey Club **29**: 668. *f. 7.* 1902.

Jalisco to Oaxaca and Yucatán.

Stems bifariously puberulent or glabrous; leaves ovate-cordate, 3 to 12 cm. long, acuminate or cuspidate-acuminate, deeply cordate at base, glabrous; peduncles equaling or shorter than the leaves, with 9 to 12 or more flowers; corolla 4 to 7 mm. long, greenish white.

14. NEPHRADENIA Decaisne in DC. Prodr. 8: 604. 1844.

1. **Nephradenia neriifolia** (Decaisne) Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. **2**: 336. 1882.

Blepharodon neriifolium Decaisne in DC. Prodr. **8**: 604. 1844.

Oaxaca; type from Totontepec. Guatemala.

Glabrous erect shrub; leaves short-petiolate, linear-lanceolate, 8 to 14 cm. long, 1 to 3 cm. wide, long-acuminate, acute at base; umbels few-flowered, axillary, short-pedunculate; calyx lobes ovate or suborbicular, ciliate; corolla campanulate, brownish, about 1 cm. broad, the lobes obtuse; corona scales laterally compressed.

15. MARSDENIA R. Br. Mem. Wern. Soc. 1: 28. 1809.

REFERENCE: Rothe, Über die Gattung *Marsdenia* R. Br. und die Stamm pflanze der Condurangorinde, Bot. Jahrb. Engler **52**: 354–434. 1915.

Plants scandent, usually fruticose or suffrutescent; flowers small or of medium size, in umbelliform cymes; calyx 5-parted, glandular within, the segments acute or obtuse; corolla campanulate, the throat usually villous, the lobes contorted, appendages sometimes present in the sinuses of the lobes; corona scales 5, adnate to the stamen tube; stigma depressed or rostrate; follicles thick, usually smooth.

Marsdenia cundurango Reichenb. f., of Peru and Ecuador, furnishes "cundurango" or "condorango" bark, which has been employed in the treatment of syphilitic affections. In Ecuador it is considered a remedy for snake bites, there being a popular belief that the condor eats the leaves to cure itself of wounds and snake bites, hence the name "condorango" or "condor-vine."

Leaves glabrous beneath except sometimes along the costa, rarely with a few hairs over the surface when very young.

Leaves oblong, 5 mm. wide or less_____1. M. parvifolia.

Leaves mostly ovate to oval, 1.5 to 6 cm. wide or larger.

Lobes of the corolla nearly twice as long as the tube_____2. M. pringlei.

Lobes little if at all exceeding the corolla tube.
Corolla throat densely barbate; leaves often acute or decurrent at base. **3. M. edulis.**
Corolla throat very sparsely or not at all barbate; leaves rounded or subcordate at base.
Stamen scales exceeding the apical membrane of the anther. **4. M. zimapanica.**
Stamen scales shorter than the membrane——**5. M. macrophylla.**
Leaves pubescent beneath, usually densely so, even at maturity.
Leaves acute or acutish at base.
Beak of the stigma about 1.5 mm. long; corolla greenish, with purple spots and stripes——**6. M. trivirgulata.**
Beak about 0.7 mm. long; corolla purplish, striped with yellowish green. **7. M. peraffinis.**
Leaves rounded or cordate at base.
Leaves soon glabrous on the upper surface——**8. M. propinqua.**
Leaves densely pubescent on the upper surface even in age.
Corolla glabrous outside.
Stigma obtuse——**9. M. bourgeana.**
Stigma pointed——**10. M. coulteri.**
Corolla sparsely or densely pubescent outside.
Corolla with appendages in the sinuses of the lobes; calyx lobes linear, acute——**11. M. gilgiana.**
Corolla not appendaged; calyx lobes ovate, obtuse——**12. M. mexicana.**

1. **Marsdenia parvifolia** T. S. Brandeg. Zoe 5: 235. 1906.
Puebla and Oaxaca.
Stems slender, fruticose, puberulent or glabrate; leaves short-petiolate, 8 to 15 mm. long, obtuse or subacute, rounded at base; corolla lobes oblong, obtuse; style elongate.

2. **Marsdenia pringlei** S. Wats. Proc. Amer. Acad. 25: 158. 1890.
Nuevo León; type collected in the Sierra de la Silla, near Monterrey.
Woody vine; leaves slender-petiolate, oval to ovate-elliptic, 5 to 11 cm. long, abruptly acuminate, thin, glabrous; umbels few or many-flowered, the pedicels 3 to 8 mm. long; calyx lobes obtuse; corolla white, 7 to 10 mm. long, glabrous.

3. **Marsdenia edulis** S. Wats. Proc. Amer. Acad. 24: 61. 1889.
Sonora and Sinaloa; type from Guaymas, Sonora.
Stems woody, the larger ones with corky bark; leaves slender-petiolate, lance-ovate to oval, 4 to 13 cm. long, acuminate; umbels many-flowered, subsessile; calyx lobes obtuse, ciliate; corolla cream-colored, about 5 mm. long; fruit ovoid, smooth, 6.5 to 10 cm. long. "Talayote" (Sonora).
The young fruit is eaten. One specimen from Sinaloa has the leaves minutely pubescent beneath and may represent a distinct species.

4. **Marsdenia zimapanica** Hemsl. Biol. Centr. Amer. Bot. 2: 338. 1882.
Hidalgo, Puebla, and Oaxaca; type from Zimapán, Hidalgo.
Woody vine, glabrous or nearly so, the leaves sometimes pilose when young; leaves petiolate, elliptic-oblong to oval, acuminate; umbels sessile or nearly so, the flowers 8 to 10 mm. long; calyx lobes obtuse; corolla glabrous outside; stigma pointed.
According to Flores, the plant is known in Hidalgo as "tequampatli" or "tecuampatli," and the root is mixed with meat and used to poison coyotes. The names may, however, apply rather to some other plant.

5. **Marsdenia macrophylla** (Humb. & Bonpl.) Fourn. in Mart. Fl. Bras. 6[4]: 321. 1885.

Asclepias macrophylla Humb. & Bonpl.; Roem. & Schult. Syst. Veg. 6: 86. 1820.

Marsdenia maculata Hook. in Curtis's Bot. Mag. *pl. 4299*. 1847.

Jalisco to Tamaulipas, San Luis Potosí, and Yucatán. Lesser Antilles, Central America, and northern South America; type from Venezuela.

Woody vine, nearly glabrous; leaves ovate to elliptic or oval, 7 to 14 cm. long, acute or acuminate, often subcordate at base, pale beneath; cymes many-flowered, short-pedunculate, calyx lobes obtuse; corolla yellowish, 5 to 6 mm. long. "Talayote" (Tamaulipas).

6. **Marsdenia trivirgulata** Bartlett, Proc. Amer. Acad. 44: 652. 1909.

Type from Iguala Canyon, Guerrero, altitude 900 meters.

Stems slender, suffruticose, bifariously puberulent; leaves slender-petiolate, elliptic, 2.5 to 5 cm. long, acuminate, puberulent; cymes subsessile, few-flowered; calyx lobes obtuse; corolla 6 mm. long.

7. **Marsdenia peraffinis** Blake, Contr. Gray Herb. 53: 48. 1918.

Guerrero and perhaps Michoacán; type from Baqueta, altitude 150 meters.

Stems woody, when young sparsely hispidulous; leaves ovate or elliptic, 3 to 6.5 cm. long, acute or acuminate, puberulent; cymes 8 to 15-flowered, sessile or nearly so; calyx lobes obtuse; corolla about 5 mm. long, glabrous outside.

8. **Marsdenia propinqua** Hemsl. Biol. Centr. Amer. Bot. 2: 337. 1882.

Tamaulipas and Veracruz; type from the region of Orizaba.

Woody vine; leaves slender-petiolate, ovate to rounded-elliptic, 8 to 17 cm. long, acuminate or abruptly short-pointed, tomentose beneath; cymes very dense, many-flowered, short-pedunculate; calyx lobes obtuse; corolla 7 to 8 mm. long, red, pubescent outside; follicles 11 to 15 cm. long, smooth.

9. **Marsdenia bourgeana** (Baill.) Rothe, Bot. Jahrb. Engler 52: 408. 1915.

Pseudomarsdenia bourgeana Baill. Hist. Pl. 10: 268. 1890.

Veracruz and Oaxaca; type from Hacienda de Cuspango.

Woody vine; leaves broadly ovate, 5 to 7 cm. long, acuminate, rounded or truncate at base, densely pubescent; cymes branched, many-flowered; calyx lobes obtuse or acute; corolla barbate within; fruit ovoid, woody.

10. **Marsdenia coulteri** Hemsl. Biol. Centr. Amer. Bot. 2: 336. 1882.

Marsdenia selerorum Loesener, Bull. Herb. Boiss. 2: 557. 1894.

Coahuila to Veracruz, Yucatán, Puebla, and Oaxaca; type from Zimapán, Hidalgo.

Coarse woody vine; leaves slender-petiolate, ovate-oblong to broadly ovate or rounded-deltoid, 3 to 7.5 cm. long, obtuse to acuminate, densely pubescent; cymes dense, many-flowered short-pedunculate; calyx lobes obtuse; corolla whitish, about 3 mm. long; fruit 6 to 13 cm. long, smooth, glabrous. "Talayote" (Tamaulipas).

11. **Marsdenia gilgiana** Rothe, Bot. Jahrb. Engler 52: 410. 1915.

Ecliptostelma molle T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 371. 1917.

Veracruz; type from Zacuapan. Guatemala.

Scandent shrub, the young stems densely pilose; leaves ovate to rounded-ovate, 9 to 15 cm. long, obtuse to short-acuminate, densely pilosulous, or

tomentose beneath; cymes pedunculate, lax, many-flowered, repeatedly dichotomous; flowers about 5 mm. long.

12. **Marsdenia mexicana** Decaisne in DC. Prodr. 8: 617. 1844.

Guerrero, Oaxaca, Morelos, and Mexico; type from Tlacolula, Oaxaca.

Large woody vine; leaves broadly cordate, 8 to 16 cm. long, acute or short-acuminate, tomentose beneath, densely pubescent above; cymes pedunculate, many-flowered, repeatedly branched; corolla about 4 mm. long; follicles 7 to 9 cm. long, densely pilose.

16. TRICHOSACME Zucc. Abh. Akad. Wiss. München 4²: 11. 1845.

A single species is known.

1. **Trichosacme lanata** Zucc. Abh. Akad. Wiss. München 4²: 11. 1845.

Described from Mexico.

Scandent shrub, densely white-lanate throughout except on the corolla; leaves ovate-cordate, acute or acuminate, petiolate; umbels axillary, dense, pedunculate, recurved; calyx lobes linear-lanceolate; corolla rotate, brown-purple, the lobes ovate, bearing at the apex a long filiform drooping barbate appendage, this much longer than the lobes; corona annular; follicles cylindric, tomentose.

17. LACHNOSTOMA H. B. K. Nov. Gen. & Sp. 3: 198. 1819.

1. **Lachnostoma gonoloboides** Greenm. Proc. Amer. Acad. 39: 84. 1903.

Type collected near Seven Star Mine, in the Sierra Madre of Chihuahua, altitude 2,400 meters.

Stems twining, chiefly herbaceous, densely pubescent; leaves long-petiolate, oblong-hastate, 5 to 9.5 cm. long, short-acuminate, cordate at base, thinly hirtellous; umbels short-pedunculate, mostly 2 to 4-flowered, the pedicels 2 to 3 cm. long; calyx lobes oblong-lanceolate; corolla white, narrowly campanulate, 1.5 to 2 cm. long, the lobes erect, acute; crown crenate.

18. MICRODACTYLON T. S. Brandeg. Zoe 5: 252. 1909.

The genus consists of a single species.

1. **Microdactylon ovatum** T. S. Brandeg. Zoe 5: 252. 1909.

Type from Barranca de Tlacuilosto, near San Luis Tultitlanapa, Puebla.

Stems fruiticose, scandent, hirsute and hirtellous; leaves slender-petiolate, ovate-cordate or oblong-ovate, 3 to 7 cm. long, rounded to acuminate at apex, pubescent; cymes racemiform, long-pedunculate; calyx lobes lanceolate; corolla purple-black, shallowly campanulate, about 2 cm. broad, hirtellous outside, long-hirsute within, the lobes deltoid-ovate, obtuse; corona adnate to the stamen tube, the scales unguiculate, divided above the middle into 2 long liguliform lobes, also with 2 shorter interior lobes.

19. DICTYANTHUS Decaisne in DC. Prodr. 8: 604. 1844.

Plants scandent or suberect, herbaceous or suffrutescent; leaves cordate; cymes few-flowered, racemiform or reduced to a single flower; flowers large, the corolla reticulate-veined; calyx 5-parted, glandular within, the lobes narrow; corolla broadly campanulate, the lobes spreading; corona scales attached to the base of the stamen tube and radiating from it, adnate dorsally to the corolla.

Corolla lobes broadly ovate, obtuse or acutish, the margins not revolute.
1. D. stapeliaeflorus.
Corolla lobes deltoid to linear-lanceolate, acuminate, the margins revolute.
Throat of the corolla vertically striped, not reticulate or reticulate only at base.
Corolla about 13 mm. long—2. D. tuberosus.
Corolla 2.5 to 4 cm. long—3. D. pavonii.
Throat of corolla reticulate or with horizontal stripes.
Corolla less than 1.5 cm. long—4. D. parviflorus.
Corolla 2 to 5 cm. long.
Corolla throat horizontally striped— 5. D. tigrinus.
Corolla throat densely reticulate—6. D. ceratopetalus.

1. Dictyanthus stapeliaeflorus Reichenb. Sel. Sem. Hort. Dresd. 4. 1850.

Type from the Sierra Madre of Durango; specimens from Guerrero probably belong here.

Stems scandent, sparsely hirsute; leaves ovate-cordate or deltoid-cordate, acute or acuminate; peduncles 1 or few-flowered; corolla 3.5 to 5 cm. broad, yellowish green, veined with purple, the veins of the lobes reticulate, those in the upper part of the throat concentric and distinct.

2. Dictyanthus tuberosus Robinson, Proc. Amer. Acad. 27: 180. 1892.

Jalisco; type from Guadalajara.

Stems suberect, suffrutescent, hirsute; leaves broadly cordate-ovate, 2 to 4 cm. long, acute or acuminate, pubescent; umbels 1 to 4-flowered, sessile or short-pedunculate; corolla campanulate, brown-purple; follicles about 5 cm. long, armed with short stout spines.

3. Dictyanthus pavonii Decaisne in DC. Prodr. 8: 605. 1844.

Tympananthe suberosa Hassk. Flora 30: 758. 1847.

Dictyanthus campanulatus Reichenb. Sel. Sem. Hort. Dresd. 4. 1850.

Rytidoloma reticulatum Turcz. Bull. Soc. Nat. Moscou 25^2: 320. 1852.

Dictyanthus reticulatus Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 329. 1882.

Sinaloa to Jalisco and Morelos.

Stems scandent, hirsutulous or glabrate; leaves long-petiolate, ovate-cordate, often broadly so, 5 to 12 cm. long, obtuse to acuminate, minutely pilose; cymes racemiform, 1 to few-flowered; corolla 4 to 7 cm. wide, broadly campanulate, the lobes reticulate-veined with brown-purple.

4. Dictyanthus parviflorus Hemsl. Biol. Centr. Amer. Bot. 2: 329. 1882.

Dictyanthus prostratus T. S. Brandeg. Univ. Calif. Publ. Bot. 7: 329. 1920.

Morelos and Veracruz; type probably from Cuernavaca. El Salvador.

Stems suberect or scandent, suffrutescent below, hirsute; leaves ovate-cordate, often broadly so, 1 to 3.5 cm. long, acute, deeply cordate at base, pubescent; flowers mostly solitary, short-pedicellate; corolla 1 to 2 cm. broad, brown-purple; follicles glabrate, tuberculate. "Yulpate" (El Salvador).

5. Dictyanthus tigrinus Conzatti & Standl., sp. nov.

Oaxaca and Veracruz; type from Laguna de Ojitlán, Distrito de Tuxtepec, Oaxaca, altitude 350 meters (*Conzatti* 3760; U. S. Nat. Herb. 1014030).

Stems scandent, sparsely hirsutulous with recurved hairs; leaves long-petiolate, ovate-cordate, 9 to 10 cm. long, 6 to 7 cm. wide, long-acuminate, deeply cordate at base, minutely puberulent; peduncles 1 to 1.5 cm. long, 1 to 4-flowered; calyx lobes lanceolate or lance-oblong, 13 mm. long, long-acuminate; corolla about 7 cm. broad, minutely puberulent, the lobes lance-

linear, with recurved margins, closely brown-reticulate, the throat covered with close concentric brown-purple stripes; lobes of the corona linear, 8 mm. long; ovary glabrous.

6. **Dictyanthus ceratopetalus** Donn. Smith, Bot. Gaz. **18**: 208. 1893.

Morelos, Puebla, and Oaxaca. Guatemala and El Salvador; type from plains of Santa Rosa, Guatemala.

Stems scandent, hirsute, woody below; leaves ovate-cordate, 2 to 7 cm. long, acute, densely pubescent; cymes 1 or few-flowered, short-pedunculate; corolla 2.5 to 4.5 cm. broad, brown-purple, closely reticulate throughout.

20. POLYSTEMMA Decaisne in DC. Prodr. 8: 602. 1844.

Stems twining, suffrutescent below, hirsute; leaves long-petiolate, ovate-cordate; cymes umbelliform, few-flowered; calyx 5-parted; corolla short-campanulate or subrotate, the throat naked; corona adnate to the gynostegium, composed of 5 ligulate scales and 20 smaller filiform ones; stigma plane.

Leaves with a closed basal sinus----------1. **P. viridiflora.**
Leaves with a broad open shallow sinus.
Corolla about 8 mm. long----------2. **P. scopulorum.**
Corolla about 20 mm. long----------3. **P. rupestris.**

1. **Polystemma viridiflora** Decaisne in DC. Prodr. **8**: 602. 1844.

Veracruz; type from Orizaba.

Leaves hirtellous; peduncles as long as the leaves, 3 or 4-flowered; corolla green, puberulent.

2. **Polystemma scopulorum** T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 189. 1915.

Type from San Gerónimo, Oaxaca.

Leaves ovate-cordate, 8 cm. long or less, acuminate, sparsely hirsute; cymes few-flowered, the peduncles about 2.5 cm. long; corolla rotate, reticulate; larger corona scales narrowly oblong, tridentate at apex.

3. **Polystemma rupestris** T. S. Brandeg. Univ. Calif. Publ. Bot. **7**: 330. 1920.

Type from Barranca de Panoaya, Veracruz.

Leaves ovate-cordate, 5 to 8 cm. long, acuminate, sparsely hirsute; cymes few-flowered, about as long as the leaves; corolla campanulate, reticulate within, the lobes acute or acuminate; larger corona scales deeply trilobate, the smaller ones filiform; follicles smooth.

21. ROTHROCKIA A. Gray, Proc. Amer. Acad. 20: 295. 1885.

Plants scandent, herbaceous or suffrutescent; leaves long-petiolate, cordate; cymes pedunculate, umbelliform or racemiform; calyx 5-parted; corolla rotate, the lobes narrow; corona simple, 5-lobate; stigma produced into a column; follicles smooth.

The following are the only species known.

Corona lobes 2-dentate, not appendaged, with 2 short lateral teeth.
1. R. cordifolia.
Corona lobes with caudate lateral processes, or with long exterior filiform appendages.
Corolla yellowish green; corona scales with lateral caudate processes about 1.5 mm. long----------**2. R. umbellata.**
Corolla purple-black; corona scales with exterior filiform appendages about 4 mm. long----------**3. R. fruticosa.**

1. **Rothrockia cordifolia** A. Gray, Proc. Amer. Acad. 20: 295. 1885.

Baja California and Sonora. Southern Arizona; type from Santa Catalina Mountains.

Stems usually suffrutescent, hirsute and puberulent; leaves broadly ovate-cordate, 2 to 8 cm. long, acute or acuminate, deeply cordate at base, pubescent; inflorescence umbellate or racemiform, few-flowered; corolla greenish white, 8 to 12 mm. long, the lobes oblong. "Talayote" (Baja California).

Brandegee reports that in Baja California the young pods are eaten raw.

2. **Rothrockia umbellata** T. S. Brandeg. Zoe 5: 165. 1903.

Cape Region of Baja California.

Stems hirsute; leaves ovate-cordate, 3 to 8 cm. long, acuminate, deeply cordate at base, hirsute and puberulent; cymes racemiform, 1 to 6-flowered; corolla 3.5 cm. broad, the lobes ovate-oblong, papillose within; follicles 12 to 15 cm. long, glabrous.

3. **Rothrockia fruticosa** T. S. Brandeg. Zoe 5: 165. 1903.

Type collected near Santa Anita, Cape Region of Baja California.

Stems fruticose below, hirsute; leaves ovate-cordate, 3 to 7 cm. long, acute or acuminate, deeply cordate at base, pubescent; flowers solitary or umbellate, the terminal pedicel 2 to 3.5 cm. long; corolla lobes about 12 mm. long, narrowly oblong; follicles 15 cm. long, glabrous.

22. VINCETOXICUM Walt. Fl. Carol. 104. 1788.

Plants usually scandent, fruticose or herbaceous; leaves mostly cordate; flowers small or large, green, brown, or nearly black; calyx 5-parted, glandular within; corolla rotate, shallowly or deeply lobate, often reticulate-veined; corona annular, adnate to the corolla, entire, dentate, or lobate; stigma depressed; follicles smooth or muricate; seeds usually with an apical tuft of hairs.

Besides the species listed below, several herbaceous ones, with erect or subscandent stems, occur in Mexico. Of a number of the species listed, no specimens have been seen, and it may be, consequently, that some names are incorrectly placed in the key.

The following vernacular names are reported for plants of this genus: "Chimicuro" (Oaxaca); "gueto de venado" (Oaxaca); "tlalayote" (Oaxaca). The name most commonly used is "talayote." The young fruits are eaten either raw or coked. Sweetmeats are sometimes made by boiling them in sirup.

Corolla glabrous within.
- Leaves mostly about 1 cm. long ---- 1. V. hastulatum.
- Leaves mostly 3 cm. long or larger.
  - Corolla about 3 mm. long ---- 2. V. saepimentorum.
  - Corolla 5 mm. long or more.
    - Corolla lobes suborbicular, oval, or broadly deltoid.
      - Stems puberulent or glabrate.
        - Peduncles about as long as the petioles; corolla glabrous outside. 3. V. lutescens.
        - Peduncles usually more than twice as long as the petioles; corolla puberulent outside ---- 4. V. cavanillesii.

Stems hirsute or hirtellous.
Leaves mostly lance-oblong, obtuse or rounded at base.
5. V. stenophyllum.
Leaves all or mostly ovate to oval, cordate at base.
Corolla glabrous outside.
Pedicels glabrous----6. V. littorale.
Pedicels hirsute----7. V. diadematum.
Corolla variously pubescent outside.
Peduncles equaling or longer than the petioles.
Peduncles 1 or 2-flowered----8. V. tingens.
Peduncles several-flowered.
Corolla about 4 cm. broad----9. V. magnifolium.
Corolla 1 to 2.5 cm. broad.
Corolla about 1 cm. broad, the lobes longer than broad.
10. V. reticulatum.
Corolla 1.5 to 2.5 cm. broad, the lobes about as broad as long----11. V. velutinum.
Peduncles much shorter than the petioles.
Corolla yellowish green----12. V. suberiferum.
Corolla brown-purple----13. V. congestum.
Corolla lobes oblong-linear to lance-oblong.
Leaves mostly acute at base----22. V. caudatum.
Leaves cordate at base.
Calyx nearly as long as the corolla----14. V. triflorum.
Calyx much shorter than the corolla.
Corolla glabrous outside.
Corolla lobes ovate-oblong, fuscous----15. V. fuscum.
Corolla lobes lance-linear, pale----16. V. petiolare.
Corolla puberulent or papillose outside.
Calyx more than half as long as the corolla; stems puberulent.
17. V. fraternum.
Calyx half as long as the corolla or usually shorter; stems usually hirsute or hirtellous.
Corolla green or yellowish.
Corolla lobes ovate-lanceolate, long-acuminate.
18. V. striatum.
Corolla lobes oblong, obtuse----19. V. chrysanthum.
Corolla purple, brown-purple, or fuscous.
Cymes shorter than the petioles----20. V. stenopetalum.
Cymes equaling or longer than the petioles.
Corolla lobes oblong-linear----21. V. asperum.
Corolla lobes lance-oblong.
Lobes of the outer corona crenulate--27. V. crenatum.
Lobes of the outer corona lacerate-dentate.
26. V. pilosum.
Corolla papillose or variously pubescent within, at least in the throat.
Leaves acute or decurrent at base----22. V. caudatum.
Leaves all or mostly cordate at base.
Corolla merely papillose or puberulent within.
Corolla glabrous outside----23. V. chloranthum.
Corolla puberulent or hirtellous outside.
Corolla lobes oval, abruptly short-acuminate, in bud overlapping for about half their breadth----24. V. macranthum.

Corolla lobes mostly oblong or lance-oblong, obtuse at the apex or gradually attenuate, in bud only slightly overlapping.
Corolla greenish—25. V. oaxacanum.
Corolla brown-purple or blackish.
Lobes of the outer corona lacerate-dentate—26. V. pilosum.
Lobes of the outer corona crenulate or obscurely denticulate.
Corolla lobes conspicuously veined—27. V. crenatum.
Corolla lobes without conspicuous venation—28. V. grayanum.
Corolla barbate or pilose within, at least in the throat.
Corolla lobes oval or suborbicular, rounded at apex—29. V. calcicola.
Corolla lobes narrow or, if broad, acute or acuminate.
Leaves glabrous beneath or nearly so.
Calyx about equaling the corolla. Leaves about as broad as long—30. V. cyclophyllum.
Calyx much shorter than the corolla.
Corolla lobes often barbate for their whole length with soft interlaced hairs—31. V. barbatum.
Corolla barbate only at the base with short stiff hairs.
32. V. pectinatum.
Leaves pilose or hirtellous beneath, usually densely so.
Corolla lobes linear—33. V. angustilobum.
Corolla lobes lance-oblong or broader.
Corolla glabrous outside or nearly so—34. V. uniflorum.
Corolla puberulent or hirtellous outside.
Corolla 2 to 2.5 cm. long—35. V. erianthum.
Corolla 1 cm. long or less.
Peduncles much longer than the petioles, long-hirsute.
36. V. nigrescens.
Peduncles mostly shorter than the petioles, puberulent or hirtellous.
Stems short-pilose or puberulent; leaves broadest near the base.
Corolla 1.5 to 2 cm. broad—37. V. nemorosum.
Corolla 6 to 8 mm. broad—38. V. jaliscense.
Stems long-hirsute; leaves broadest above the middle.
39. V. xanthotrichum.

1. **Vincetoxicum hastulatum** (A. Gray) Heller, Muhlenbergia **1**: 2. 1900.
Lachnostoma hastulatum A. Gray Proc. Amer. Acad. **11**: 87. 1876.
Gonolobus hastulatus A. Gray, Proc. Amer. Acad. **12**: 78. 1876.
Baja California; type from Tantillas Canyon.
Stems slender, chiefly herbaceous, finely pubescent; leaves hastate, slender-petiolate, pubescent; flowers mostly solitary, short-pedicellate, whitish; corolla lobes oblong-linear; follicles fusiform, 5 to 6 cm. long, smooth or with few short tubercles.

2. **Vincetoxicum saepimentorum** T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 381. 1913.
Type from Baños del Carrizal, Veracruz.
Stems glabrous or nearly so; leaves ovate-cordate, 4 to 6 cm. long, acuminate, glabrous or nearly so; inflorescence racemiform, equaling or longer than the leaves; corolla lobes oblong, obtuse.

3. Vincetoxicum lutescens Standl.

Gonolobus luteolus Decaisne in DC. Prodr. **8**: 593. 1844. Not *Vincetoxicum luteolum* Jord. & Fourr. 1866.

Type from Teapa, Tabasco.

Leaves ovate-cordate, short-acuminate or attenuate, sparsely short-pilose or glabrate; flowers subracemose; sepals glabrous; corolla lobes ovate, acutish.

4. Vincetoxicum cavanillesii Standl.

Cynanchum nigrum Cav. Icon. Pl. **2**: *pl. 459*, 1793. Not *Vincetoxicum nigrum* Moench, 1794.

Gonolobus niger R. Br. Mem. Wern. Soc. **1**: 35. 1809.

San Luis Potosí and Veracruz.

Leaves ovate-cordate, 4 to 7.5 cm. long, acuminate or cuspidate-acuminate, puberulent; inflorescence umbelliform, few-flowered, the flowers slender-pedicellate; corolla blackish, the lobes obtuse, about 5 mm. long.

5. Vincetoxicum stenophyllum Standl.

Gonolobus lanceolatus Decaisne in DC. Prodr. **8**: 598. 1844. Not *Vincetoxicum lanceolatum* Kuntze, 1891.

Veracruz; type collected near the city of Veracruz.

Stems retrorse-pilose; leaves short-petiolate, lance-oblong or ovate-lanceolate, 5.5 to 8 cm. long, acuminate, densely velutinous-pubescent; peduncles very short, few-flowered; corolla about 2 cm. broad, the lobes rounded, green, spotted with white.

6. Vincetoxicum littorale (Decaisne) Standl.

Gonolobus littoralis Decaisne in DC. Prodr. **8**: 596. 1844.

Type from sandhills near Veracruz.

Stems hirtellous and pilose; leaves cordate, attenuate at apex, sparsely pilose above, more densely so beneath; peduncles shorter than the petioles, few-flowered; corolla greenish, the lobes ovate-deltoid.

7. Vincetoxicum diadematum (Edwards) Standl.

Gonolobus diadematus Edwards, Bot. Reg. **3**: *pl. 252*. 1817.

Described from cultivated plants of Mexican origin; reported by Robinson and Greenman[1] from Tepic.

Stems fruticose, with corky bark, the young ones hirsute; leaves elliptic-oblong, 5 to 7.5 cm. long or larger, acuminate, cordate at base, hirsute; umbels short-pedunculate, few-flowered; corolla greenish yellow; fruit 5-angulate.

8. Vincetoxicum tingens (Decaisne) Standl.

Gonolobus tingens Decaisne in DC. Prodr. **8**: 592. 1844.

Type from Zimapán, Hidalgo.

Stems hirtellous; leaves ovate-cordate, acuminate, pubescent; peduncles equaling the petioles; calyx lobes ovate, subotuse; corolla lobes ovate, obtuse, velutinous outside, green and fuscous.

9. Vincetoxicum magnifolium (Pittier) Standl.

Gonolobus magnifolius Pittier, Contr. U. S. Nat. Herb. **13**: 104. *f. 13*. 1910.

Oaxaca. Costa Rica; type from forests of Las Vueltas de Tucurrique.

Large woody vine, the stems hirtellous and puberulent; leaves rounded-cordate, 13 to 24 cm. long, acute or acuminate, densely pubescent; cymes few-flowered; calyx lobes broadly elliptic, 10 to 14 mm. long, obtuse; corolla brownish or greenish, the lobes rounded-oval, rounded at apex.

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[1] Proc. Amer. Acad. **29**: 389. 1894.

10. Vincetoxicum reticulatum (Engelm.) Heller, Bot. Expl. Texas 79. 1895.

Gonolobus reticulatus Engelm.; A. Gray, Proc. Amer. Acad. 12: 75. 1876.

Nuevo León and San Luis Potosí; reported from Sonora. Western Texas to southern Arizona.

Stems hirsute: leaves ovate-cordate, 4 to 10 cm. long, acuminate, hirsute; umbels 5 to 9-flowered; corolla green, with purplish venation, the lobes obtuse; follicles 7 to 12 cm. long, muricate.

11. Vincetoxicum velutinum (Schlecht.) Standl.

Gonolobus velutinus Schlecht. Linnaea 13: 521. 1833.

Veracruz; type from Jalapa.

Stems hirsute and puberulent; leaves rounded-cordate, 4.5 to 13.5 cm. long, rounded to short-acuminate at apex, velutinous; peduncles few-flowered, the flowers greenish.

12. Vincetoxicum suberiferum (Robinson) Standl.

Gonolobus suberiferus Robinson, Proc. Amer. Acad. 27: 181. 1892.

Type from San José Pass, San Luis Potosí.

Stems woody, covered with pale yellowish corky bark, hirsute when young; leaves ovate, 3.5 to 5 cm. long, acuminate, pubescent; peduncles 1-flowered; corolla 3 cm. broad, the lobes ovate, obtuse; follicles slender, smooth, 7.5 cm. long or more.

13. Vincetoxicum congestum (Decaisne) Standl.

Gonolobus congestus Decaisne in DC. Prodr. 8: 597. 1844.

Jalisco to Oaxaca; type from Oaxaca, altitude 1,500 meters.

Stems hirsute; leaves ovate-cordate, 4 to 11 cm. long, acute or acuminate, pilose; cymes dense, few-flowered, subsessile; corolla about 1 cm. broad, the lobes deltoid-ovate.

Gonolobus sidaefolius Mart. & Gal.,[1] described from Veracruz, may be a synonym.

14. Vincetoxicum triflorum (Mart. & Gal.) Standl.

Gonolobus triflorus Mart. & Gal. Bull. Acad. Brux. 11[1]: 365. 1844.

Type from Peñoles, Mixteca Alta, Oaxaca, altitude 1,950 meters.

Stems pubescent; leaves cordate-ovate or ovate-lanceolate, acuminate, pubescent; peduncles 3-flowered, shorter than the petiole; corolla greenish, the lobes ovate-lanceolate.

Perhaps a synonym of *V. uniflorum*.

15. Vincetoxicum fuscum (Decaisne) Standl.

Gonolobus fuscus Decaisne in DC. Prodr. 8: 592. 1844.

Type from Arumbaro, near Morelia, Michoacán, altitude 1,050 meters.

Stems hirtellous; leaves ovate, attenuate at apex, appressed-pilose, or subvelutinous beneath; peduncles shorter than the leaves.

16. Vincetoxicum petiolare (A. Gray) Standl.

Gonolobus petiolaris A. Gray, Proc. Amer. Acad. 21: 397. 1886.

Chihuahua and Sinaloa; type from Batopilas, Chihuahua.

Stems woody below, covered with corky bark, hirsute when young; leaves ovate-cordate or oblong-cordate, 5 to 11 cm. long, acuminate, pubescent; peduncles few-flowered, equaling or shorter than the petioles; corolla about 13 mm. long; follicles slender, smooth, 18 cm. long or less.

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[1] Bull. Acad. Brux. 11[1]: 367. 1844.

17. Vincetoxicum fraternum (Schlecht.) Standl.

Gonolobus fraternus Schlecht. Linnaea **13**: 521. 1833.

San Luis Potosí and Veracruz; type from Hacienda de la Laguna, Veracruz.

Leaves oblong-ovate, 4 to 7 cm. long, acute or short-acuminate, cordate at base, with a broad sinus, glabrate above, pubescent beneath; peduncles shorter than the petioles, few-flowered; corolla 8 to 10 mm. long.

18. Vincetoxicum striatum (Mart. & Gal.) Standl.

Gonolobus striatus Mart. & Gal. Bull. Acad. Brux. **11**[1]: 365. 1844.

Type from El Sabino.

Stems pubescent-hirtous; leaves cordate-ovate, acuminate, about 5 cm. long, pubescent; peduncles about 3-flowered, scarcely longer than the petioles; corolla about 2.5 cm. broad.

19. Vincetoxicum chrysanthum (Greenm.) Standl.

Gonolobus chrysanthus Greenm. Proc. Amer. Acad. **32**: 299. 1897.

Mexico, Morelos, Oaxaca, and Michoacán; type from Pátzcuaro, Michoacán.

Stems hirsute and puberulent; leaves oblong-ovate, 5 to 10 cm. long, acuminate, cordate at base, hirtellous or hirsute; peduncles loosely few-flowered, equaling or shorter than the petioles; corolla 1.5 to 2.5 cm. broad, yellow.

20. Vincetoxicum stenopetalum (A. Gray) Standl.

Gonolobus stenopetalus A. Gray, Proc. Amer. Acad. **21**: 398. 1886.

Chihuahua; type collected near the city of Chihuahua.

Stems suberect, woody at base, hirsute; leaves ovate-cordate, 5 to 10 cm. long, acuminate, puberulent and hispidulous; corolla 8 to 12 mm. long; follicles ovoid, muricate and hispidulous; seeds without coma.

21. Vincetoxicum asperum (Decaisne) Standl.

Gonolobus asper Decaisne in DC. Prodr. **8**: 595. 1844.

Gonolobus purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. **3**: 387. 1909.

Oaxaca and Puebla; type from Cerro San Felipe, Oaxaca.

Stems hirtellous; leaves cordate-ovate, obtuse to acuminate, rough above, papillose beneath and sparsely hirsute; peduncles few-flowered; corolla 18 to 25 mm. long.

22. Vincetoxicum caudatum (A. Gray) Standl.

Gonolobus caudatus A. Gray, Proc. Amer. Acad. **21**: 399. 1886.

Gonolobus caudatus trachyanthus Greenm. Proc. Amer. Acad. **33**: 482. 1898.

Chihuahua to Puebla and Oaxaca; type from Hacienda San José, south of Batopilas, Chihuahua.

Stems woody, erect, sparsely puberulent or glabrate; leaves slender-petiolate, lanceolate, caudate-acuminate, glabrous or nearly so, 4 cm. long or less; peduncles 1-flowered; corolla fuscous, 5 to 8 mm. long.

In the typical form the corolla is glabrous within; in *G. caudatus trachyanthus* it is granular-puberulent.

23. Vincetoxicum chloranthum (Schlecht.) Standl.

Gonolobus chloranthus Schlecht. Linnaea **13**: 520. 1833.

Veracruz; type from Jalapa.

Stems retrorse-pilose; leaves ovate-oblong, acuminate, shallowly cordate at base, pubescent; peduncles shorter than the leaves, several-flowered; corolla about twice as long as the calyx.

24. Vincetoxicum macranthum (Kunze) Standl.

Gonolobus macranthus Kunze, Linnaea **20**: 27. 1847.

Fischeria alta T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 276. 1912.

Nuevo León to Veracruz; type from Hacienda de la Laguna, Veracruz. Guatemala.

Stems densely pilosulous; leaves ovate-cordate or ovate-oblong, 5 to 9 cm. long, acuminate, pubescent; peduncles 1 to 3-flowered; corolla about 3.5 cm. broad, greenish, reticulate-veined.

25. Vincetoxicum oaxacanum Standl.

Gonolobus tristis Decaisne in DC. Prodr. **8**: 596. 1844. Not *Vincetoxicum triste* Griseb. 1844.

Oaxaca; type from mountains of Oaxaca, altitude 2,100 meters.

Stems glandular-papillose and sparsely hirtellous; leaves ovate-cordate, 4.5 to 8 cm. long, acuminate, glandular-puberulent beneath and sparsely hirtellous; corolla about 1 cm. long.

26. Vincetoxicum pilosum (Benth.) Standl.

Gonolobus pilosus Benth. Pl. Hartw. 289. 1848.

Jalisco to San Luis Potosí, Morelos, and Puebla; type from León, Guanajuato.

Stems pilosulous; leaves ovate-cordate, 4 to 8 cm. long, acuminate, pubescent; peduncles few-flowered, equaling or longer than the petioles; corolla 1.5 to 2.5 cm. long; follicles slender, smooth, about 10 cm. long. "Flor del muerto" (Guanajuato, *Dugès*).

27. Vincetoxicum crenatum Vail, Bull. Torrey Club **26**: 429. 1899.

Type from Cuernavaca, Morelos.

Stems retrorsely pilose; leaves cordate-ovate, 5 to 8 cm. long, acuminate, papillose-puberulent; peduncles few-flowered, longer than the petioles; corolla 13 to 14 mm. long.

28. Vincetoxicum grayanum Standl.

Gonolobus atratus A. Gray, Proc. Amer. Acad. **22**: 436. 1887. Not *Vincetoxicum atratum* Morr. & Decaisne, 1836.

Jalisco; type from Río Blanco.

Stems woody, hirsute when young; leaves oblong-ovate, 5 to 7 cm. long, acuminate, cordate at base, viscid-puberulent beneath; peduncles few-flowered, mostly longer than the petioles; corolla 3.5 to 4 cm. broad, black.

29. Vincetoxicum calcicola (Greenm.) Standl.

Gonolobus calcicola Greenm. Proc. Amer. Acad. **40**: 30. 1904.

Type from Jojutla, Morelos.

Stems woody below, hirtellous and papillose-puberulent; leaves ovate-cordate, 3 to 6 cm. long, acuminate, granular-puberulent beneath; peduncles few-flowered, shorter than the petioles; corolla about 2 cm. broad, brown-purple.

30. Vincetoxicum cyclophyllum Standl., sp. nov.

Type from Cañón de la Mano Negra, near Iguala, Guerrero (*Rose, Painter & Rose* 9355; U. S. Nat. Herb. 452841).

Stems stout, glabrous, rising from a thick woody root; leaves long-petiolate, reniform-cordate, 6 to 11.5 cm. long, 6 to 10 cm. wide, rounded at apex and abruptly short-acuminate, deeply cordate at base, glabrous or sparsely puberulent beneath near the base; cymes sessile, few-flowered, the flowers on stout puberulent pedicels; calyx lobes linear-lanceolate, 10 to 14 mm. long, glabrous; corolla brown-purple, about 1 cm. long, the lobes deltoid-ovate, subacute, barbate within; outer corona entire or nearly so.

31. Vincetoxicum barbatum (H. B. K.) Standl.

Gonolobus barbatus H. B. K. Nov. Gen. & Sp. 3: 209. *pl. 239.* 1819.

Gonolobus sororius A. Gray, Proc. Amer. Acad. 22: 437. 1887.

Sinaloa to Oaxaca and Yucatán; type from Campeche. Guatemala and El Salvador.

Stems puberulent or glabrate; leaves ovate-cordate or deltoid-cordate, 2 to 5.5 cm. long, acuminate, with broad shallow sinus at base; cymes sessile or short-pedunculate, the pedicels long and slender; corolla about 1 cm. long; fruit ovoid, 8 to 12 cm. long, longitudinally winged, glabrous. "Matacoyote," "cuchamper de zope" (El Salvador).

32. Vincetoxicum pectinatum (T. S. Brandeg.) Standl.

Gonolobus pectinatus T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 387. 1909.

Puebla and Oaxaca; type from San Luis Tultitlanapa, Puebla.

Stems puberulent and sparsely hirtellous or glabrate; leaves broadly ovate-cordate, 3 to 6 cm. long, short-acuminate; cymes short-pedunculate, few-flowered, the pedicels long and slender; corolla greenish, about 13 mm. long; fruit ovoid, about 9 cm. long, 5-winged.

33. Vincetoxicum angustilobum (Robins. & Greenm.) Standl.

Gonolobus angustilobus Robins. & Greenm. Proc. Amer. Acad. 29: 388. 1894.

Type collected near Tepic.

Stems puberulent and hirsute; leaves ovate-cordate, 5 to 6 cm. long, acuminate, pubescent beneath; peduncles shorter than the petioles, 1-flowered; calyx lobes ovate, acute; corolla green, about 2.5 cm. broad.

34. Vincetoxicum uniflorum (H. B. K.) Standl.

Gonolobus uniflorus H. B. K. Nov. Gen. & Sp. 3: 207. *pl. 238.* 1819.

Veracruz, Mexico, Morelos, Puebla, and Oaxaca; type collected near the city of Mexico.

Stems puberulent and pilose; leaves ovate-cordate or ovate-oblong, 4 to 8 cm. long, acuminate, pubescent; peduncles shorter than the petioles, 1 or few-flowered, the flowers long-pedicellate; corolla greenish, 3.5 to 4.5 cm. broad. "Rosa verde" (*Ramírez*).

Gonolobus virescens Decaisne,[1] described from Regla, Hidalgo, appears to be closely related.

35. Vincetoxicum erianthum (Decaisne) Standl.

Gonolobus erianthus Decaisne in DC. Prodr. 8: 592. 1844.

Jalisco to Veracruz and Oaxaca; type from Oaxaca. Guatemala.

Stems retrorse-pilose or puberulent, woody below; leaves mostly oblong-ovate, 4 to 11 cm. long, acuminate, cordate at base, pubescent; peduncles short, few-flowered; corolla greenish, reticulate-veined. "Talayote," "flor del muerto" (Guanajuato, *Dugès*); "cachayumbo" (Oaxaca).

36. Vincetoxicum nigrescens (Schlecht.) Standl.

Gonolobus nigrescens Schlecht. Linnaea 8: 522. 1833.

San Luis Potosí and Veracruz; type from Hacienda de la Laguna, Veracruz.

Stems hirsute; leaves ovate-cordate, 4 to 10 cm. long, acute, velutinous; peduncles slender, often longer than the leaves, hirsute, few-flowered; corolla blackish, about 8 mm. broad, long-pilose within.

37. Vincetoxicum nemorosum (Decaisne) Standl.

Gonolobus nemorosus Decaisne in DC. Prodr. 8: 596. 1844.

Oaxaca; type from Mixteca Alta.

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[1] In DC. Prodr. 8: 596. 1844.

Branchlets retrorse-pilose or puberulent; leaves oblong-ovate or lance-oblong, 4 to 9 cm. long, acuminate, sparsely or densely pubescent beneath; peduncles short, few-flowered; corolla greenish, reticulate-veined; fruit ovoid, coarsely muricate.

38. **Vincetoxicum jaliscense** (Robins. & Greenm.) Standl.

Gonolobus jaliscensis Robins. & Greenm. Proc. Amer. Acad. **29**: 389. 1894.

Jalisco to Morelos; type from Guadalajara.

Stems retrorse-pubescent; leaves oblong or ovate-oblong, 3 to 7 cm. long, acuminate, cordate or truncate at base, densely pubescent beneath; peduncles very short, few-flowered; corolla yellowish green; follicles fusiform, striate.

39. **Vincetoxicum xanthotrichum** (T. S. Brandeg.) Standl.

Gonolobus xanthotrichus T. S. Brandeg. Zoe **5**: 251. 1908.

Veracruz and Oaxaca; type from Zacuapan, Veracruz.

Stems densely hirsute; leaves short-petiolate, oblong-obovate, 8 to 11 cm. long, abruptly acuminate, rounded or shallowly cordate at base, hirsute; umbels sessile or subsessile, the pedicels long and slender; corolla about 1 cm. long, hirsute outside, barbate in the throat.

DOUBTFUL SPECIES.

GONOLOBUS ALTATENSIS T. S. Brandeg. Zoe **5**: 244. 1908. Type from Altata, Sinaloa.

GONOLOBUS GRACILIS Decaisne in DC. Prodr. **8**: 596. 1844. Type from Oaxaca.

GONOLOBUS INCONSPICUUS T. S. Brandeg. Univ. Calif. Publ. Bot. **3**: 387. 1909. Type from Puebla.

VINCETOXICUM ATROCORONATUM T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 372. 1917. Type from Barranca de las Pilas, Puebla.

VINCETOXICUM CHIAPENSE T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 190. 1915. Type from Cerro del Boquerón, Chiapas.

VINCETOXICUM MEGACARPHUM T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 381. 1913. Type from Baños del Carrizal, Veracruz.

VINCETOXICUM PUEBLENSE T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 91. 1910. Type from Puebla.

23. HIMANTOSTEMMA A. Gray, Proc. Amer. Acad. **20**: 294. 1885.

A single species is known.

1. **Himantostemma pringlei** A. Gray, Proc. Amer. Acad. **20**: 294. 1885.

Baja California and Sonora; type collected south of Altar, Sonora.

Vine, woody below, the stems hirtellous; leaves long-petiolate, ovate-cordate or deltoid cordate, 2 to 4.5 cm. long, acute, hirtellous and puberulent; peduncles short, mostly 2-flowered; calyx lobes linear-lanceolate; corolla rotate, 7 to 8 mm. long, 5-parted, brown-purple, the lobes lanceolate, covered within with numerous long linear-spatulate hairs; corona simple, of 10 long linear stipitate scales and of 5 short ones; follicicles about 8 cm. long, 1.5 to 2 cm. thick, glabrous, covered with long spinelike appendages.

24. UROSTEPHANUS Robins. & Greenm. Amer. Journ. Sci. III. **50**: 159. 1895.

The genus consists of a single species.

1. **Urostephanus gonoloboides** Robins. & Greenm. Amer. Journ. Sci. III. **50**: 159. 1895.

Type collected on hills near Oaxaca, altiude 1,800 meters.

Stems scandent, chiefly herbaceous, fulvous-hirsute; leaves ovate-cordate, 4 to 6.5 cm. long, acuminate, hirsute, slender-petiolate; cymes umbelliform, sub-

sessile; calyx 5-parted, the lobes ovate-lanceolate, 4 mm. long; corolla rotate, brown-purple or green, 10 to 12 mm. long, the lobes lance-oblong, pilose outside, lanate in the throat; corona tubular, with 5 internal hornlike processes and with 5 alternating external lobes, these each produced externally into 2 filiform flexuous appendages; stigma depressed.

DOUBTFUL GENERA.

IRMISCHIA FLORIBUNDA Schlecht. Linnaea 19: 739. 1845. Type from tropical Mexico.

MICROSTELMA Baill. Hist. Pl. 10: 286. 1891. The genus is said to consist of two Mexican species, neither of which is given a name.

PACHYSTELMA CORDATUM T. S. Brandeg. Univ. Calif. Publ. Bot. 7: 330. 1920. Type from Acasonica, Veracruz.

STELMAGONUM HAHNIANUM Baill. Hist. Pl. 10: 287. 1891. Type from Mexico.

TRICHOSTELMA CILIATUM Baill. Hist. Pl. 10: 288. 1891. Type from Mexico.

142. CONVOLVULACEAE. Morning-glory Family.

Plants erect or scandent, woody or herbaceous; leaves alternate, simple or digitately compound, often lobate, estipulate; flowers regular, perfect, usually large and showy, commonly cymose; calyx inferior, 5-parted, the sepals free or nearly so, strongly imbricate; corolla gamopetalous, funnelform, salverform, or campanulate, the limb 5-lobate, commonly induplicate-valvate; stamens 5, inserted on the corolla tube; style simple or bifid, the stigma or stigmas capitate or bifid; fruit capsular, 2 to 5-celled, the cells 1 or 2-seeded.

Several genera of the family are represented in Mexico only by herbaceous species.

Style bifid ..... 1. **BREWERIA.**
Style simple below the stigma.
  Sepals small at first, in age accrescent and leaflike ..... 2. **PORANA.**
  Sepals not accrescent or, if so, not becoming leaflike.
    Stigma with 2 elongate lobes ..... 3. **JACQUEMONTIA.**
    Stigma entire or with 2 subglobose lobes.
      Anthers spirally twisted ..... 4. **OPERCULINA.**
      Anthers not twisted.
        Stamens more or less exserted.
          Corolla salverform, with broad limb, white or purple. 5. **CALONYCTION.**
          Corolla tubular, with very narrow limb, usually red or yellow. 6. **EXOGONIUM.**
        Stamens included.
          Capsule dehiscent, usually with 2 or more seeds ..... 7. **IPOMOEA.**
          Capsule indehiscent, 1-seeded ..... 8. **TURBINA.**

1. BREWERIA R. Br. Prodr. Fl. Nov. Holl. 487. 1810.

Shrubs or herbs, scandent or erect; leaves entire; cymes axillary or terminal, or the flowers solitary; sepals subequal or the outer larger; corolla campanulate, the limb plicate, 5-angulate; ovary 2-celled, 4-ovulate; style bifid or the stigmas 2 and distinct.

Flowers in cymes ..... 1. **B. sulphurea.**
Flowers solitary.
  Leaves linear-lanceolate; stems erect ..... 2. **B. multicaulis.**
  Leaves ovate or oval; stems prostrate ..... 3. **B. ovalifolia.**

1. **Breweria sulphurea** T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 384. 1913.
Type from Baños del Carrizal, Veracruz.
Stems suffrutescent, scandent; leaves elliptic-oblong to oval-ovate, 4 to 7.5 cm. long, rounded and mucronulate at apex, rounded at base, fulvous-tomentose beneath, petiolate; flowers mostly long-pedicellate; sepals 1 to 1.5 cm. long; corolla 1.5 cm. long, hirsute.

2. **Breweria multicaulis** T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 185. 1911.
Type from Sierra del Rey, Coahuila.
Stems stout, suffrutescent, densely white-tomentose; leaves sessile, 1 to 2.5 cm. long, acute or attenuate, acute at base, densely pubescent; flowers subsessile; sepals 10 to 14 mm. long; corolla 3.5 cm. long, blue, hirsute.

3. **Breweria ovalifolia** (Torr.) A. Gray, Syn. Fl. 2[1]: 217. 1878.
Evolvulus ovalifolius Torr. U. S. & Mex. Bound. Bot. 150. 1859.
Type collected along the Rio Grande below San Carlos, Coahuila.
Plant probably herbaceous, sericeous-canescent; leaves about 2.5 cm. long, subcordate at base; peduncles very short; capsule globose, 12 mm. in diameter.

2. PORANA Burm. Fl. Ind. 51. 1768.

The other species are natives of the Old World.

1. **Porana velutina** (Mart. & Gal.) Hallier, Bot. Jahrb. Engler 16: 538. 1893.
Dufourea velutina Mart. & Gal. Bull. Acad. Brux. 12[2]: 259. 1845.
Breweria mexicana Hemsl. Biol. Centr. Amer. Bot. 2: 400. 1882.
Morelos, Puebla, and Oaxaca; type collected near La Venta de Aragón, between Tehuacán and Oaxaca, altitude 900 meters.
Scandent shrub; leaves petiolate, oblong-ovate to broadly ovate, 4 to 9 cm. long, acuminate, rounded or obtuse at base, entire, sericeous, especially beneath, or in age glabrate; flowers in axillary, few or many-flowered cymes, slender-pedicellate; sepals very unequal, the 3 outer ones larger, oval, becoming as much as 18 mm. long, rounded at apex, glabrate; corolla funnelform, about 1.5 cm. long, sericeous outside; stamens included; ovary 2-celled, 4-ovulate; style filiform, unequally bifid, the stigmas capitate.

3. JACQUEMONTIA Choisy, Mém. Soc. Phys. Hist. Nat. Genève 6: 476. 1833.

Stems usually scandent, herbaceous or fruticose; leaves entire, usually cordate; flowers blue or white, cymose or capitate, axillary; sepals subequal or the outer ones larger; corolla broadly or narrowly campanulate, the limb plicate, 5-angulate; ovary 2-celled, 4-ovulate; style filiform, the stigmas 2, ovate or oblong; seeds usually glabrate.
All the Mexican species are listed here, but some of them are wholly herbaceous.

Flowers in headlike clusters, the bracts foliaceous.
Bracts, except the outermost, linear——1. J. tamnifolia.
Bracts all broad.
Corolla glabrous outside; pubescence of the leaves spreading.
2. J. pycnocephala.
Corolla hirsute; pubescence of the leaves appressed——3. J. perryana.
Flowers in loose or dense cymes, the bracts small.
Sepals rounded or obtuse at apex, not apiculate.
Sepals glabrous——4. J. nodiflora.
Sepals pubescent.
Corolla about 12 mm. long——5. J. simulata.
Corolla about 40 mm. long——6. J. nelsoni.

Sepals acute or acuminate, or at least apiculate.
Sepals glabrous----------7. J. oaxacana.
Sepals variously pubescent.
Inflorescence glandular-pilose----------8. J. azurea.
Inflorescence without glandular pubescence.
Cymes many-flowered, usually dense.
Sepals very densely pubescent. Leaves densely pubescent on both surfaces----------9. J. abutiloides.
Sepals sparsely pubescent or glabrate.
Leaves acute or acuminate, glabrate----------10. J. pentantha.
Leaves rounded at apex and mucronate or cuspidate, densely pubescent beneath----------11. J. apiculata.
Cymes mostly 3 or 4-flowered.
Sepals all of equal length----------12. J. palmeri.
Sepals unequal, the outer ones slightly longer.
Sepals densely pilosulous. Leaves mostly obtuse, densely pubescent----------9. J. abutiloides.
Sepals sparsely pubescent or glabrate, or minutely tomentulose.
Leaves acute to acuminate, the upper ones slender-petiolate. 13. J. pringlei.
Leaves obtuse or rounded at apex and mucronate, the upper ones usually subsessile----------14. J. smithii.

1. Jacquemontia tamnifolia (L.) Griseb. Fl. Brit. W. Ind. 474. 1861.
Ipomoea tamnifolia L. Sp. Pl. 162. 1753.
Jacquemontia macrocephala T. S. Brandeg. Zoe 5: 219. 1905.
Thyella macrocephala House, Muhlenbergia 5: 68. 1909.
Sinaloa. Southern United States, West Indies, South America, and tropical Africa.
Stems herbaceous, pilose; leaves ovate or ovate-cordate, slender-petiolate, acuminate; flower heads long-pedunculate, many-flowered, hirsute; corolla blue, about 12 mm. long.

2. Jacquemontia pycnocephala Benth. Bot. Voy. Sulph. 137. 1844.
Thyella pycnocephala House, Bull. Torrey Club 33: 314. 1906.
Guerrero, the type from Acapulco.
Stems densely fulvous-pilose; leaves long-petiolate, broadly ovate-cordate, 2.5 to 5 cm. long, cuspidate-mucronate, densely pubescent; heads on long or short peduncles, the bracts rounded-ovate or deltoid-ovate; corolla about 1.5 cm. long, blue.

3. Jacquemontia perryana Duchass. & Walp. Linnaea 23: 751. 1850.
Ipomoea lactescens Seem. Bot. Voy. Herald 171. 1854.
Oaxaca. Panama; type collected near the city of Panama.
Stems chiefly or wholly herbaceous, hirsute or glabrate; leaves long-petiolate, broadly ovate-cordate, 4.5 to 8 cm. long, acuminate; heads long-pedunculate, very dense, hirsute; corolla white, about 3.5 cm. long.

4. Jacquemontia nodiflora (Desr.) Don, Hist. Dichl. Pl. 4: 283. 1838.
Convolvulus nodiflorus Desr. in Lam. Encyl. 3: 557. 1789.
Sinaloa to Oaxaca and Veracruz. West Indies; Central and South America.
Stems often suffrutescent, tomentose; leaves short-petiolate, oblong-lanceolate to broadly ovate-cordate, 3 to 5.5 cm. long, acute or acuminate, densely tomentose beneath; cymes many-flowered, short-pedunculate; corolla white, about 12 mm. long.

5. **Jacquemontia simulata** House, Bull. Torrey Club 33: 314. 1906.

Yucatán.

Stems woody below, tomentose when young; leaves broadly ovate-cordate, 2 to 6 cm. long, obtuse and mucronate, densely tomentose beneath; cymes dense, many-flowered; corolla white, about 12 mm. long.

This has been reported from Yucatán as *J. abutiloides*.

6. **Jacquemontia nelsoni** House, Muhlenbergia 5: 67. 1909.

Type collected between Nopala and Mixistepec, Oaxaca.

Stems pubescent; leaves short-petiolate, ovate or oblong-ovate, 3 to 4 cm. long, acuminate, rounded at base, hirtellous beneath; cymes long-pedunculate, many-flowered; sepals about 8 cm. long; corolla white (?).

7. **Jacquemontia oaxacana** (Meisn.) Hallier, Bot. Jahrb. Engler 16: 543. 1893.

Jacquemontia parviflora oaxacana Meisn. in Mart. Fl. Bras. 7: 297. 1869.

Sinaloa to Veracruz and Oaxaca; type from mountains of Oaxaca.

Stems pubescent or glabrate; leaves ovate-cordate, 3 to 5.5 cm. long, acuminate, pilose beneath or finally glabrate; peduncles usually much longer than the leaves, the cymes many-flowered; corolla blue, 1 to 1.5 cm. long.

8. **Jacquemontia azurea** (Desr.) Choisy, Mém. Soc. Phys. Hist. Nat. Genève 6: 476. 1833.

Convolvulus azureus Desr. in Lam. Encyl. 3: 554. 1789.

Convolvulus sphaerostigma Cav. Icon. Pl. 5: 54. *pl. 481.* 1799.

Convolvulus apocynoides Schlecht. & Cham. Linnaea 5: 117. 1830.

Jacquemontia hirsuta Choisy, Mém. Soc. Phys. Hist. Nat. Genève 8: 63. 1838.

Convolvulus secundiflorus Fernald, Proc. Amer. Acad. 33: 90. 1897.

Jacquemontia pauciflora T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 384. 1913.

Veracruz, Oaxaca, and Chiapas. Central and South America.

Stems chiefly or wholly herbaceous, glandular-pilose, slender; leaves ovate-oblong to rounded-ovate, 1 to 4 cm. long, mostly long-acuminate, pilose; cymes mostly 3-flowered, the flowers short-pedicellate; corolla blue, about 1 cm. long.

9. **Jacquemontia abutiloides** Benth. Bot. Voy. Sulph. 34. 1844.

Baja California and Sonora; type from Magdalena Bay, Baja California.

Woody vine, usually densely tomentose almost throughout; leaves short-petiolate, ovate or rounded-ovate, 1 to 4 cm. long, rounded to acuminate at apex, mucronate, usually deeply cordate at base; cymes on long or short peduncles, dense, usually few-flowered; corolla blue, 1.2 to 1.5 cm. long.

10. **Jacquemontia pentantha** (Jacq.) Don, Hist. Dichl. Pl. 4: 283. 1838.

Convolvulus pentanthus Jacq. Coll. Bot. 4: 210. 1790.

Convolvulus violaceus Vahl, Symb. Bot. 3: 29. 1794.

Jacquemontia violacea Choisy, Mém. Soc. Phys. Hist. Nat. Genève 8: 61. 1838.

Sinaloa to Veracruz and Yucatán. Southern Florida, West Indies, Central and South America.

Stems chiefly herbaceous, pubescent or glabrate; leaves ovate or ovate-cordate, 2 to 9 cm. long; peduncles mostly longer than the leaves; corolla 1.2 to 2 cm. long, blue or rarely white.

11. **Jacquemontia apiculata** House, Muhlenbergia 5: 66. 1909.

Chihuahua and Tamaulipas; type from Victoria, Tamaulipas.

Stems thinly tomentose; leaves rounded-cordate, 2 to 5 cm. long, shallowly cordate at base; peduncles longer than the leaves, the cymes lax, the flowers mostly long-pedicellate; corolla blue, about 2 cm. long. "Enredadera" (Tamaulipas).

12. **Jacquemontia palmeri** S. Wats. Proc. Amer. Acad. **24**: 63. 1889.
Jacquemontia palmeri varians T. S. Brandeg. Zoe 5: 170. 1903.
Baja California and Sonora; type from Guaymas, Sonora.
Stems herbaceous, thinly tomentose or pilose; leaves ovate-cordate, 1.5 to 4.5 cm. long, obtuse or acute, pilose or glabrate; peduncles slender, longer than the leaves; corolla blue, 7 to 8 mm. long.

13. **Jacquemontia pringlei** A. Gray, Proc. Amer. Acad. **17**: 227. 1882.
Jacquemontia pringlei glabrescens A. Gray, Proc. Amer. Acad. **21**: 402. 1886.
Chihuahua and Sonora; Oaxaca (?). Type from Santa Catalina Mountains, Arizona; also in El Salvador.
Slender vine, woody below, the stems pubescent or glabrate; leaves broadly ovate-cordate, 1.5 to 6 cm. long, pubescent or glabrate; peduncles equaling or longer than the leaves; corolla 1.5 to 2.5 cm. long, pale blue or white. "Campanilla" (El Salvador).

14. **Jacquemontia smithii** Robins. & Greenm. Amer. Journ. Sci. **50**: 160. 1895.
Puebla and Oaxaca; type from Cuicatlán, Oaxaca, altitude 540 meters.
Stems erect or nearly so, woody below, puberulent; leaves broadly ovate, 1 to 5 cm. long, usually subcordate at base, puberulent or tomentulose; peduncles longer than the leaves; corolla blue, 12 to 15 mm. long.

EXCLUDED SPECIES.

JACQUEMONTIA CHIAPENSIS T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 60. 1914. This plant, described from Tonalá, Chiapas, is *Aniseia martinicensis* (Jacq.) Choisy.

4. OPERCULINA Manso, Enum. Subst. Bras. 16. 1836.

REFERENCE: House, Bull. Torrey Club **33**: 495–503. 1906.
Stems scandent, herbaceous or fruticose; leaves varying from entire to digitately compound; calyx large, pyriform, constricted above, the sepals scarious or chartaceous; corolla campanulate or funnelform; anthers spirally twisted; capsule large, 2-celled and 4-seeded or imperfectly 4-celled; seeds usually glabrous.

Leaves entire.
- Peduncles conspicuously winged ..... 1. O. alatipes.
- Peduncles not at all or only obscurely winged.
  - Leaves lance-linear ..... 2. O. lancifolia.
  - Leaves ovate-cordate or rounded-cordate.
    - Sepals 2 to 2.5 cm. long; corolla tube twice as long as the calyx. ..... 3. O. rhodocalyx.
    - Sepals 3 cm. long or more; corolla tube little exceeding the calyx. ..... 4. O. discoidesperma.

Leaves lobed or digitately compound.
- Leaves digitately compound, divided to the petiole.
  - Plants hirsute ..... 5. O. aegyptia.
  - Plants glabrous.
    - Corolla yellow ..... 6. O. aurea.
    - Corolla white or whitish.
      - Leaflets long-acuminate ..... 7. O. palmeri.
      - Leaflets obtuse ..... 8. O. platyphylla.

Leaves pinnately lobed or deeply palmate-lobed, but not divided to the petiole.
Corolla yellow; capsule 3 to 4 cm. in diameter——9. O. tuberosa.
Corolla white or whitish; capsule 1 to 2 cm. in diameter.
Plants hirsute——10. O. dissecta.
Plants glabrous.
Leaves deeply lobed, the lobes extending nearly to the costa.
11. O. ornithopoda.
Leaves lobed less than halfway to the costa——12. O. pectinata.

1. **Operculina alatipes** (Hook.) House, Bull. Torrey Club 33: 499. 1906.
Ipomoea alatipes Hook. in Curtis's Bot. Mag. *pl. 5330.* 1862.
Ipomoea alata Rose, Contr. U. S. Nat. Herb. 1: 108. 1891. Not *I. alata* R. Br. 1810.
Operculina rubicunda House, Bull. Torrey Club 33: 498. 1906.
Sonora to Chiapas. Central America and Colombia.
Plants glabrous, chiefly herbaceous; leaves lanceolate to broadly ovate-cordate, 3 to 8 cm. long, acuminate; sepals about 2.5 cm. long; corolla red, the tube 4 to 5 cm. long; seeds black, glabrous. "Mechoacán," "campanilla," "quiebra cajete" (El Salvador).

2. **Operculina lancifolia** House, Muhlenbergia 5: 68. 1909.
Type from Valley of Jiquipilas, Chiapas, altitude 660 to 840 meters.
Plants glabrous, herbaceous; leaves 5 to 7 cm. long, 4 to 8 mm. wide, sagittate-cordate at base; peduncles 1-flowered; sepals about 2 cm. long; corolla pink, 5 cm. long.

3. **Operculina rhodocalyx** (A. Gray) House, Bull. Torrey Club 33: 498. 1906.
Ipomoea rhodocalyx A. Gray, Proc. Amer. Acad. 22: 439. 1887.
Sinaloa and Jalisco; type from Tequila, Jalisco.
Plants glabrous; leaves ovate-cordate, 5 to 10 cm. long, acuminate; peduncles 1 or 2-flowered; calyx reddish; corolla yellow, 5 to 6 cm. long; seeds glabrous.

4. **Operculina discoidesperma** (Donn. Smith) House, Muhlenbergia 5: 68. 1909.
Ipomoea discoidesperma Donn. Smith, Bot. Gaz. 14: 27. 1889.
Coahuila to Guanajuato and Chiapas. Guatemala; type from Pansamalá.
Plants glabrous; leaves rounded-cordate, 6 to 15 cm. long, acuminate; peduncles 2 or 3-flowered; corolla yellow, about 5 cm. long; capsule about 2.5 cm. in diameter, 1-seeded, the seed compressed, 1 cm. broad, densely pubescent.

5. **Operculina aegyptia** (L.) House, Bull. Torrey Club 33: 502. 1906.
Ipomoea aegyptia L. Sp. Pl. 162. 1753.
Convolvulus pentaphyllus L. Sp. Pl. ed. 2. 233. 1763.
Ipomoea pentaphylla Jacq. Coll. Bot. 2: 297. 1788.
Ipomoea sinaloensis T. S. Brandeg. Zoe 5: 217. 1905.
Merremia aegyptia Urban, Symb. Antill. 4: 505. 1910.
Sinaloa to Chiapas and Yucatán. Widely distributed in the tropics of both hemispheres.
Stems chiefly herbaceous; leaflets 5, elliptic or obovate, 4 to 10 cm. long, acuminate; calyx densely hirsute; corolla white, about 2.5 cm. long; seeds glabrous.

6. **Operculina aurea** (Kellogg) House, Muhlenbergia 5: 68. 1909.
Aniseia aurea Kellogg, Proc. Calif. Acad. 5: 83. 1873.
Ipomoea aurea Kellogg; Curran, Bull. Calif. Acad. 1: 143. 1885.
Baja California.

Woody vine; leaflets obovate, elliptic, or lance-ovate, 1 to 4 cm. long, obtuse to acuminate; sepals in fruit 3 to 3.5 cm. long; corolla about 5 cm. long; seeds densely pubescent.

7. **Operculina palmeri** (S. Wats.) House, Bull. Torrey Club 33: 502. 1906.
Ipomoea palmeri S. Wats. Proc. Amer. Acad. 24: 63. 1889.
Sonora and Sinaloa; type from Guaymas, Sonora.
Woody vine; leaflets linear-lanceolate, 9 cm. long or less, acute at base; sepals in fruit 4 cm. long; corolla about 6.5 cm. long; seeds densely pubescent.

8. **Operculina platyphylla** (Fernald) House, Bull. Torrey Club 33: 502. 1906.
Ipomoea palmeri platyphylla Fernald, Proc. Amer. Acad. 33: 90. 1897.
Type from Acapulco, Guerrero.
Stems suffrutescent; leaflets elliptic or obovate; sepals in fruit 3.5 cm. long; corolla 7 cm. long.

9. **Operculina tuberosa** (L.) Meisn. in Mart. Fl. Bras. 7: 212. 1869.
Ipomoea tuberosa L. Sp. Pl. 160. 1753.
Campeche. Central and South America, West Indies, and Old World tropics; type from Jamaica.
Plants glabrous, climbing over trees; leaves mostly 7-lobate, 5 to 12 cm. long, the lobes acuminate, entire; sepals in fruit as much as 6 cm. long; corolla 4 to 5.5 cm. long; seeds densely pubescent.

10. **Operculina dissecta** (Jacq.) House, Bull. Torrey Club 33: 500. 1906.
Convolvulus dissectus Jacq. Obs. Bot. 2: 4. 1767.
Ipomoea sinuata Ortega, Hort. Matr. Dec. 84. 1798.
Merremia dissecta Hallier, Bot. Jahrb. Engler 18: 114. 1894.
Sinaloa to Coahuila, Tamaulipas, San Luis Potosí, and Oaxaca. Florida and Texas; West Indies; Central and South America.
Stems chiefly herbaceous; leaves mostly 5-lobate, the lobes 2 to 8 cm. long, deeply lobate; sepals in fruit about 3 cm. long; corolla 3.5 to 4 cm. long; seeds black, glabrous.

11. **Operculina ornithopoda** (Robinson) House, Bot. Gaz. 43: 414. 1907.
Ipomoea ornithopoda Robinson, Proc. Amer. Acad. 27: 183. 1892.
Operculina roseana House, Bull. Torrey Club 33: 500. 1906.
Operculina angustiloba House, Bull. Torrey Club 33: 501. 1906.
Ipomoea megacarpa T. S. Brandeg. Zoe 5: 218. 1905.
Operculina ornithopoda megacarpa Robinson, Proc. Amer. Acad. 51: 530. 1916.
Sinaloa to Tamaulipas, Veracruz, Yucatán, and Chiapas; type from Las Canoas, San Luis Potosí.
Stems chiefly herbaceous; leaves mostly 5-lobate, the lobes linear to ovate or rhombic, entire or lobate, usually acute or acuminate; sepals in fruit about 1.5 cm. long; corolla 4 to 5 cm. long; seeds glabrous.
In the typical form the lobes of the leaves are linear. The more common form with broad lobes is *O. ornithopoda megacarpa* (T. S. Brandeg.) Robinson.

12. **Operculina pectinata** House, Muhlenbergia 5: 69. 1909.
San Luis Potosí and Oaxaca; type from Lagunas, Oaxaca.
Stems chiefly herbaceous; leaves 4 to 7 cm. long, long-acuminate, truncate at base, coarsely pectinate-dentate or lobate; sepals 12 to 14 mm. long; corolla 3.5 to 4.5 cm. long.

DOUBTFUL SPECIES.

OPERCULINA AMPLIATA (Choisy) House, Bull. Torrey Club 33: 503. 1906. *Ipomoea ampliata* Choisy in DC. Prodr. 9: 361. 1845. Type from Campeche. Leaves said to be subtrilobate.

5. CALONYCTION Choisy, Mém. Soc. Phys. Hist. Nat. Genève 6: 440. 1833.

Plants scandent, usually glabrous; leaves cordate, entire or lobate; flowers large, white or purple, axillary, cymose or solitary; sepals unequal; corolla salverform, with long slender tube and broad limb; stamens exserted; stigma capitate, bilobate; fruit 2-celled.

Corolla purple----------1. C. muricatum.
Corolla white.

Outer sepals with stout hornlike appendages----------2. C. aculeatum.
Outer sepals not appendaged----------3. C. tastense.

1. Calonyction muricatum (L.) Don, Hist. Dichl. Pl. 4: 264. 1838.
Convolvulus muricatus L. Mant. Pl. 1: 44. 1767.
Ipomoea muricata Jacq. Pl. Hort. Schönbr. 3: 40. 1798.
Ipomoea spinulosa T. S. Brandeg. Zoe 5: 169. 1903.

Baja California to Sinaloa, Chihuahua, and Yucatán. Northern South America.

Plants glabrous, the stems usually armed with short stout recurved prickles; leaves broadly cordate-ovate, 5 to 16 cm. long, acuminate, deeply cordate at base; flowers solitary or in few-flowered cymes, the pedicels thickened above; outer sepals subulate-cuspidate; corolla tube 3 to 5 cm. long; seeds glabrous.

2. Calonyction aculeatum (L.) House, Bull. Torrey Club 31: 590. 1904.
Convolvulus aculeatus L. Sp. Pl. 155. 1753.
Ipomoea alba L. Sp. Pl. 161. 1753.
Ipomoea bona-nox L. Sp. Pl. ed. 2. 228. 1762.
Calonyction speciosum Choisy, Mém. Soc. Phys. Hist. Nat. Genève 6: 441. 1833.
Calonyction bona-nox Bojer, Hort. Maur. 227. 1837.
Ipomoea aculeata Kuntze, Rev. Gen. Pl. 2: 442. 1891.

Baja California and Sinaloa to Veracruz, Yucatán, and Chiapas. Widely distributed in tropical regions of both hemispheres.

Stems herbaceous or suffrutescent, often armed with recurved prickles; leaves 5 to 15 cm. long or larger, entire or 3 to 5-lobate, acuminate, glabrous; peduncles 1 or few-flowered, the pedicels much thickened in age; corolla tube 8 to 12 cm. long, the limb 6 to 10 cm. broad; capsules about 2 cm. long; seeds shining, dark brown or nearly black, minutely pubescent. "Bejuco de puerco," "bejuco de vaca" (Porto Rico); "galán de noche," "bejuco de tabaco," "garza," "pitoreta" (El Salvador).

The vine is commonly cultivated under the name of "moonflower." The large, very showy flowers open late in the evening. The milky juice is employed in tropical America for coagulating the latex of *Castilla*, the rubber tree. In India the young seeds are eaten, and the plant is there a popular remedy for snake bites. In El Salvador the stems are employed for hanging tobacco to dry.

3. Calonyction tastense (T. S. Brandeg.) House, Bull. Torrey Club 33: 318. 1906.
Ipomoea tastensis T. S. Brandeg. Zoe 5: 168. 1903.

Type from the Sierra El Taste, Baja California.

Glabrous woody vine; leaves broadly cordate, 6 to 8 cm. long, long-acuminate, entire or coarsely dentate; corolla 10 to 14 cm. long, the limb 8 to 10 cm. broad; seeds finely pubescent.

6. **EXOGONIUM** Choisy, Mém. Soc. Phys. Hist. Nat. Genève 6: 443. 1833.

REFERENCE: House, The genus *Exogonium*, Bull. Torrey Club 35: 97–107. *pl. 1, 2.* 1908.

Woody vines; leaves usually entire; flowers solitary or in axillary cymes or racemes, the bracts often large and colored; sepals equal or unequal; corolla subtubular, red, white, or yellow, the tube long, the limb very narrow; stamens and style protruding; ovary 2-celled, 4-ovulate; stigma capitate, bilobate; seeds usually hairy.

Corolla yellow. Bracts inconspicuous----------1. **E. luteum.**
Corolla red or pink.
Bracts cordate, purple or pink----------2. **E. bracteatum.**
Bracts never cordate, green or minute and caducous.
Flowers sessile in the upper axils----------3. **E. velutifolium.**
Flowers pedicellate, in cymes.
Corolla glabrous outside----------4. **E. argentifolium.**
Corolla pubescent outside----------5. **E. conzattii.**

1. **Exogonium luteum** House, Bull. Torrey Club 35: 103. *pl. 2, f. e.* 1908.

Type from Cuesta de Chiquihuetlán, Oaxaca, altitude 990 meters.

Stems minutely pubescent; leaves deltoid-ovate, 5 to 8 cm. long, acuminate, pubescent; cymes long-pedunculate, many-flowered; corolla 3 to 5 cm. long.

2. **Exogonium bracteatum** (Cav.) Choisy; Don, Hist. Dichl. Pl. 4: 264. 1838.

Ipomoea braeteata Cav. Icon. Pl. 5: 51. *pl. 447.* 1799.
Ipomoea spieata H. B. K. Nov Gen. & Sp. 3: 112. 1819.
Ipomoea eineta Roem. & Schult. Syst. Veg. 4: 254. 1819.
Convolvulus obvallatus Spreng. Syst. Veg. 1: 595. 1825.
Exogonium olivae Bárcena, Viaje Cav. Cacahuam. 29. 1874.
Convolvulus bractiflorus Sessé & Moc. Pl. Nov. Hisp. 23. 1887.

Baja California to Chihuahua, Morelos, and Oaxaca; type from Mazatlán (Guerrero ?).

Woody vine, glabrous throughout; leaves ovate-cordate, 6 to 9 cm. long, long-acuminate; flowers racemose, the bracts reniform, 2 to 3.5 cm. long, imbricate, obtuse or acute, prominently veined; corolla 3 to 3.5 cm. long. "Jícama" (Sonora); "bejuco blanco" (Sinaloa); "azalea de la barranca" (Jalisco); "carnestolenda" (Guerrero, *Langlassé*); "gallinitas del cerro," "empadanilla" (Oaxaca, *Reko*); "flor de candelaria" (Guerrero).

When in flower the plant is very showy, rivaling *Bougainvillea*, which it strongly suggests. The leaves are usually but not always absent at the time of flowering. The roots are large, watery, and sweet, and they are often eaten along the Pacific coast, either raw or cooked. The plant is illustrated by Hernández.[1]

Exogonium bracteatum pubeseens (Robins. & Greenm.) House,[2] described from Guadalajara, is a pubescent form.

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[1] Thesaurus 388. 1651.

[2] Bull. Torrey Club 35: 101. 1908. *Ipomoea braeteata pubescens* Robins. & Greenm. Amer. Journ. Sci. 50: 160. 1895.

3. **Exogonium velutifolium** House, Bull. Torrey Club **35**: 100. 1908.

Type from west side of Valley of Cuicatlán, Oaxaca.

Leaves short-petiolate, oblong-ovate, 1 to 3 cm. long, obtuse, densely pubescent; bracts linear-lanceolate; corolla crimson, 3 cm. long, glabrous.

4. **Exogonium argentifolium** (A. Rich.) House, Bull. Torrey Club **35**: 102. 1908.

Ipomoea argentifolia A. Rich. in Sagra, Hist. Cuba **11**: 131. 1850.

Puebla and Oaxaca. Cuba; type from Isle of Pines.

Leaves petiolate, oblong-lanceolate to elliptic-oblong, 2 to 10 cm. long, acute or obtuse, acute or rounded at base, whitish-tomentose or finally glabrate; cymes many-flowered; corolla about 4.5 cm. long.

5. **Exogonium conzattii** (Greenm.) House, Bull. Torrey Club **35**: 102. 1908.

Ipomoea conzattii Greenm. Field Mus. Bot. **2**: 258. 1907.

Guerrero and Oaxaca; type from Almoloyas, Guerrero.

Cymes many-flowered, the pedicels white-tomentose; sepals tinged with red, obtuse; corolla about 3 cm. long.

7. IPOMOEA L. Sp. Pl. 159. 1753.

REFERENCE: House, The North American species of the genus *Ipomoea*, Ann. N. Y. Acad. Sci. **18**: 181–263. 1908.

Plants erect or scandent, usually herbaceous but sometimes woody; leaves entire, dentate, or lobate, sometimes digitately compound; flowers solitary, racemose, or cymose; sepals membranaceous or herbaceous; corolla usually funnelform, the limb spreading; stamens included; ovary 2 to 5-celled.

Numerous herbaceous species of the genus occur in Mexico. The best-known representative of the genus is the sweet-potato ("camote"), *Ipomoea batatas* (L.) Lam., which is widely cultivated in Mexico. Other species, known as "morning-glories," or in Spanish as "campanilla," are often grown as ornamental vines because of their beautiful flowers.

Plants erect, stout; leaves usually not cordate at base.
  Plants large shrubs or trees; leaves entire.
    Corolla pink or purple; seeds densely black-hairy——1. I. crassicaulis.
    Corolla white; seeds white-hairy only on the angles.
      Corolla and sepals densely lanate outside——2. I. murucoides.
      Corolla and sepals glabrous or pubescent, not lanate.
        Leaves densely pubescent beneath, with prominent venation.
          Leaves mostly ovate, cordate at base——3. I. arborescens.
          Leaves mostly lance-oblong, rounded at base——4. I. cuernavacensis.
        Leaves glabrous beneath or nearly so, the venation not prominent.
          Sepals hairy within, 12 to 16 mm. long——5. I. intrapilosa.
          Sepals glabrous within, 8 to 12 mm. long.
            Leaves mostly 7 to 13 cm. long——6. I. wolcottiana.
            Leaves 2 to 4 cm. long——7. I. calva.
  Plants low, 30 to 60 cm. high, fruticose only at base; leaves often trilobate. 8. I. ciervensis.

Plant scandent; leaves usually cordate at base.
  Sepals herbaceous, often elongate; ovary usually 3-celled.
    Inflorescence capitate or leafy-bracted.
      Stems minutely pubescent or tomentose.
        Leaves silvery-sericeous beneath; stems tomentose——9. I. maireti.
        Leaves glabrate beneath; stems nearly glabrous——10. I. invicta.

Stems hirsute.
Corolla 7 to 9 cm. long----11. I. lambii.
Corolla 4 to 6 cm. long.
Pubescence of the stems retrorse----12. I. hirtiflora.
Pubescence of the stems spreading----13. I. igualensis.
Inflorescence cymose, the bracts inconspicuous----14. I. ampullacea.
Sepals coriaceous or membranaceous, not elongate; ovary usually 2 or 4-celled.
Seeds with long dorsal or marginal hairs, these longer than the seed or the seeds covered with long hairs.
Inflorescence racemose; seeds covered on all surfaces with long hairs. 15. I. bombycina.
Inflorescence cymose; seeds with dorsal or marginal hairs only.
Sepals hirsute, tomentose, or sericeous.
Sepals hirsute----16. I. crinita.
Sepals tomentose or sericeous.
Corolla white----17. I. praecana.
Corolla purple----18. I. carnea.
Sepals glabrous or nearly so.
Sepals about 7 mm. long----19. I. populina.
Sepals 10 to 20 mm. long----20. I. scopulorum.
Seeds glabrous or finely pubescent.
Sepals very unequal.
Sepals cuspidate.
Stems pilose----21. I. purpusi.
Stems glabrous----22. I. jicama.
Sepals obtuse or acutish.
Leaves subsessile----23. I. sagittula.
Leaves long-petiolate.
Leaves 3 or 5-lobate----24. I. vulsa.
Leaves entire or dentate.
Corolla yellow----25. I. lindenii.
Corolla white or purple.
Corolla white, 4 to 5 cm. long----26. I. anisomeres.
Corolla purple, 2 cm. long----27. I. oligantha.
Sepals equal or nearly so.
Corolla salverform----28. I. chenopodiifolia.
Corolla funnelform or campanulate-funnelform.
Corolla blue or purple----29. I. morelii.
Corolla white.
Leaves rounded at base----30. I. robinsonii.
Leaves cordate at base----31. I. dimorphophylla.

1. **Ipomoea crassicaulis** (Benth.) Robinson, Proc. Amer. Acad. 51: 530. 1916.
Batatas crassicaulis Benth. Bot. Voy. Sulph. 134. 1844.
Ipomoea fistulosa Mart.; Choisy in DC. Prodr. 9: 349. 1845.
Ipomoea texana Coulter, Contr. U. S. Nat. Herb. 1: 45. 1890.

Sinaloa to Nuevo León, Tamaulipas, Veracruz, and Chiapas, probably only naturalized northward. Texas; Central and South America.

Shrub, usually 1 to 2 meters high; leaves ovate-cordate to lance-cordate, 8 to 26 cm. long, long-acuminate, minutely puberulent or glabrous, entire; corolla 5 to 8 cm. long. "Hiedra de la India" (Sinaloa); "barós" (Tamaulipas, *Wooton*); "palo santo de Castilla" (Sinaloa); "chilco," "campanilla," "campanola" (El Salvador).

It is reported from Brazil that the leaves are poisonous to goats.

2. Ipomoea murucoides Roem. & Schult. Syst. Veg. 4: 248. 1819.
Convolvulus macranthus H. B. K. Nov. Gen. & Sp. 3: 95. 1819.
Ipomoea macrantha Don, Hist. Dichl. Pl. 4: 267. 1838. Not *I. macrantha* Roem. & Schult. 1819.

Michoacán to Oaxaca, Puebla, Mexico, and Querétaro; type from Guanajuato. Guatemala.

Large or small tree, the branchlets densely white-tomentose; leaves oblong-lanceolate, 7 to 20 cm. long, rounded or obtuse at base, long-acuminate, entire, tomentose or glabrate beneath; sepals 2 to 2.8 cm. long; corolla 7 to 8 cm. long. "Palo del muerto" (Mexico, Oaxaca); "micaquahuitl" (Nahuatl); "casahuate," "cazazuate" (Mexico, Oaxaca; from the Nahuatl *cuau-zahuatl*, "mangy-tree"); "árbol del muerto" (Morelos, Mexico); "casahuate prieto" (Morelos); "palo bobo" (Morelos, Oaxaca, Querétaro); "palo de ozote," "ozote" (Oaxaca); "cazahuate blanco," "árbol del venado" (*Seler*); "siete camisas," "siete pellejos," "tutumuste" (Guatemala, *Pittier*).

The vernacular names doubtless apply also to the related species. A decoction of the wood is employed locally in the form of baths as a remedy for paralysis. The juice is milky. The ashes are employed in Guatemala as a substitute for soap in washing clothes. The fallen flowers are eaten by deer.

3. Ipomoea arborescens (Humb. & Bonpl.) Don, Hist. Dichl. Pl. 4: 267. 1838.
Convolvulus arborescens Humb. & Bonpl.; Willd. Enum. Pl. 1: 204. 1809.
Argyreia oblonga Benth. Bot. Voy. Sulph. 133. 1844.
Convolvulus quahutzehuatl Sessé & Moc. Pl. Nov. Hisp. 23. 1887.
Ipomoea murucoides glabrata Rose, Contr. U. S. Nat. Herb. 1: 107. 1891.

Sonora, Sinaloa, Morelos, and Veracruz. El Salvador.

Large tree with smooth white bark; leaves 8 to 18 cm. long, obtuse or acute; sepals 6 to 10 mm. long, pubescent on both sides; corolla about 5 cm. long; seeds black. "Palo blanco" (Sonora, Sinaloa); "palo del muerto," "casahuate," "quauhzahuatl," "casahuate blanco" (Morelos); "palo santo" (Sonora); "palo bobo" (Morelos, El Salvador); "tutumushte," "siete pellejos," "siete camisas" (El Salvador).

When in flower the tree is a very showy one. It blooms when leafless. In some localities it forms extensive forests known as "casahuateras." In Morelos there is a popular belief that the tree causes imbecility and other cerebral affections, and for this it is necessary only to drink the water running at the foot of the trees. It is reputed also to be poisonous to horses and cattle. In Sinaloa the bark is used as a remedy for bites of rattlesnakes and other poisonous animals, and for diseases of the spleen.

4. Ipomoea cuernavacensis House, Bot. Gaz. 43: 410. 1907.
Convolvulus arboreus Sessé & Moc. Pl. Nov. Hisp. 23. 1887. Not *C. arboreus* Balb. 1841.

Type from Cuernavaca.

Similar to *I. arborescens;* leaves 10 to 16 cm. long, acuminate.

Probably only a variant of *I. arborescens.*

5. Ipomoea intrapilosa Rose, Gard. & For. 7: 367. 1894.
Ipomoea murucoides glabrata A. Gray, Proc. Amer. Acad. 22: 440. 1887.

Sonora to Oaxaca, Morelos, Zacatecas, and Durango; type from Chapala, Jalisco.

Large or small tree, nearly glabrous; leaves linear-lanceolate to ovate, 5 to 25 cm. long, acute to attenuate, obtuse to truncate at base; corolla 4 to 5 cm. long, the limb 7 to 8 cm. broad. "Cazahuate blanco" (Jalisco); "palo blanco" (Durango); "palo bobo," "zozote" (Jalisco); "pájaro bobo" (Oaxaca).

6. **Ipomoea wolcottiana** Rose, Gard. & For. 7: 367. 1894.

Colima to Chiapas and Morelos; type from Manzanillo, Colima.

Small or medium-sized tree; leaves ovate to rounded-ovate, obtuse to long-acuminate, rounded to subcordate at base; corolla 6 to 7 cm. long. "Pájaro bobo" (Chiapas); "acote" (Colima).

A decoction of the bark is used as a remedy for kidney diseases.

7. **Ipomoea calva** House, Bot. Gaz. 43: 410. *f. 1.* 1907.

Type from La Junta, Guerrero.

Leaves lanceolate, long-acuminate, obtuse at base; corolla about 5 cm. long. Probably only a form of *I. wolcottiana.*

8. **Ipomoea ciervensis** Painter; House, Bot. Gaz. 43: 408. 1907.

Type from Hacienda del Ciervo, Querétaro.

Stems erect, suffrutescent at base, stout, 30 to 60 cm. high, densely pubescent; leaves sessile or nearly so, elliptic or elliptic-ovate, 4 to 6.5 cm. long, obtuse or acute, often shallowly trilobate; peduncles 1-flowered; corolla white, about 6 cm. long, white-pilose outside.

9. **Ipomoea maireti** Choisy in DC. Prodr. 9: 374. 1845.

Tepic and Durango to Oaxaca and Veracruz. Guatemala.

Stems suffrutescent below; leaves rounded-cordate, 7 to 15 cm. long, acuminate, entire, pilosulous or glabrate above; peduncles 1 to 3-flowered, the bracts large, ovate; sepals about 2 cm. long; corolla 7 to 10 cm. long, pink or blue.

10. **Ipomoea invicta** House, Ann. N. Y. Acad. Sci. 18: 193. 1908.

Type from San Sebastián, Jalisco.

Leaves broadly ovate-cordate, 8 to 14 cm. long, acuminate or cuspidate, glabrate above, entire; peduncles 2 or 3-flowered, nearly as long as the leaves; bracts large, colored; corolla about 6 cm. long, blue.

11. **Ipomoea lambii** Fernald, Bot. Gaz. 20: 535. 1895.

Type from Zopilote, Tepic.

Stems retrorse-hirsute; leaves broadly ovate-cordate, 7 to 15 cm. long, acuminate, often 3-lobate; peduncles elongate, 2 to 4-flowered; corolla rose-purple.

12. **Ipomoea hirtiflora** Mart. & Gal. Bull. Acad. Brux. 12^2: 264. 1845.

Type from Chinantla, Oaxaca. Guatemala.

Leaves rounded-cordate 6 to 17 cm. long, often 3-lobate, sericeous beneath, hirsute above; peduncles about as long as the leaves, several-flowered; corolla purple, hirsute.

13. **Ipomoea igualensis** Weatherby, Proc. Amer. Acad. 45: 427. 1910.

Type from Iguala Canyon, Guerrero, altitude 760 meters.

Leaves broadly ovate-cordate, 8 to 12 cm. long, acuminate, hirsute, entire; peduncles elongate, 3-flowered; sepals 13 mm. long; corolla pale purple.

14. **Ipomoea ampullacea** Fernald, Proc. Amer. Acad. 33: 89. 1897.

Type from Acapulco, Guerrero.

Woody vine, the stems retrorse-hispidulous; leaves rounded-cordate, acute, entire or trilobate, appressed-hirsutulous; corolla white, about 6 cm. long, appressed-setulose; seeds finely pubescent.

15. **Ipomoea bombycina** (Choisy) Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 384. 1882.

Bombycospermum mexicanum Presl, Reliq. Haenk. 2: 137. *pl. 71.* 1836.

Batatas bombycina Choisy in DC. Prodr. 9: 340. 1845.

Guerrero.

Large woody vine; leaves ovate or elliptic, 5 to 10 cm. long, glabrate above, sericeous beneath, acute or acuminate, obtuse or rounded at base; racemes many-flowered; sepals 4 to 6 mm. long, obtuse; corolla 4.5 cm. long, purplish, sericeous.

16. **Ipomoea crinita** T. S. Brandeg. Zoe 5: 216. 1905.

Type from Culiacán, Sinaloa.

Stems woody below, hirsute; leaves 3-lobate; peduncles longer than the leaves, several-flowered; sepals 7 mm. long; corolla white, about 6.5 cm. long.

17. **Ipomoea praecana** House, Ann. N. Y. Acad. Sci. 18: 227. 1908.

Morelos and Oaxaca; type from Reyes, Oaxaca. Guatemala.

Large woody vine, the young branches white-tomentose; leaves suborbicular, 8 to 22 cm. long, subcordate at base, tomentose beneath; peduncles short, 3 to 5-flowered; corolla white, 6 to 9 cm. long.

18. **Ipomoea carnea** Jacq. Enum. Pl. Carib. 13. 1760.

Yucatán. West Indies; Central and South America; type from Cartagena, Colombia.

Stout woody vine; leaves rounded-cordate, obtuse or acute, densely pubescent beneath; peduncles short, few or many-flowered; corolla about 8 cm. long.

19. **Ipomoea populina** House, Ann. N. Y. Acad. Sci. 18: 226. 1908.

Guerrero; type from Acapulco.

Stems woody, glabrous; leaves ovate-cordate, 5 to 8 cm. long, acuminate, glabrous; peduncles elongate, several-flowered; corolla white, tinged below with magenta, 6 cm. long.

20. **Ipomoea scopulorum** T. S. Brandeg. Zoe 5: 169. 1903.

Baja California and Sinaloa; type from Cape Region of Baja California.

Stems suffrutescent below; leaves ovate-cordate, 6 to 7 cm. long, acute, pubescent; peduncles 1 to few-flowered; corolla white, 6 to 8 cm. long.

21. **Ipomoea purpusi** House, Ann. N. Y. Acad. Sci. 18: 248. 1908.

Type from Zacuapan, Veracruz.

Leaves broadly ovate-cordate, deeply trilobate, 5 to 8 cm. long, densely appressed-hirsute; peduncles elongate, 1 to 5-flowered; corolla about 3 cm. long.

22. **Ipomoea jicama** T. S. Brandeg. Bull. Calif. Acad. II. 2: 188. 1889.

Baja California.

Glabrous vine with slender woody stems; leaves broadly cordate-ovate, small, acute or acuminate, entire or dentate; corolla 5 to 6 cm. long. "Jícama."

23. **Ipomoea sagittula** House, Ann. N. Y. Acad. Sci. 18: 244. 1908.

Type collected between San Sebastián and Las Palmas, Jalisco.

Slender woody vine, glabrous or nearly so; leaves oblong-sagittate, 4 to 7 cm. long, acute or acuminate, mucronate; peduncles slender, 1 to 5-flowered; corolla white, about 3 cm. long.

24. **Ipomoea vulsa** House, Muhlenbergia 3: 45. *pl. 1, f. A, b.* 1907.

Type from Orizaba, Veracruz.

Glabrous vine; leaves with oblong or obovate-lanceolate, obtuse lobes; peduncles elongate, 1 or 2-flowered; corolla purplish, 3 to 4 cm. long.

25. **Ipomoea lindenii** Mart. & Gal. Bull. Acad. Brux. 12[2]: 264. 1845.

Type from Zacuapan, Veracruz.

Glabrous woody vine; leaves ovate, 5 to 10 cm. long, acuminate, shallowly cordate at base; peduncles short, 1 to 3-flowered; corolla 3 to 5 cm. long.

26. **Ipomoea anisomeres** Robins. & Bartl. Proc. Amer. Acad. **43**: 57. 1907.
Puebla. Guatemala; type from Gualán.
Glabrous vine; leaves ovate-cordate, 6 to 11 cm long, acute; peduncles elongate, many-flowered; corolla 6.5 to 7 cm. long, white with purple throat.

27. **Ipomoea oligantha** Choisy in DC. Prodr. **9**: 380. 1845.
Oaxaca. South America; type from Peru.
Stems puberulent; leaves deltoid-ovate, 5 to 10 cm. long, caudate-acuminate, deeply cordate at base, the basal lobes acute; peduncles 3 to 5-flowered.

28. **Ipomoea chenopodiifolia** (Mart. & Gal.) Hemsl. Biol. Centr. Amer. Bot. **2**: 385. 1882.
Calonyction chenopodiifolium Mart. & Gal. Bull. Acad. Brux. **12²**: 269. 1845.
Type from Juquila, Jalisco.
Stems woody, muricate, hirsute; leaves 8 to 12 cm. long, pilose beneath, hastate at base; peduncles short, 1-flowered; corolla purple, 5 to 8 cm. long.

29. **Ipomoea morelii** Duchass. & Walp. Linnaea **23**: 752. 1850.
Chiapas. Panama (type locality) and Colombia.
Glabrous vine, the stems often woody; leaves ovate-cordate, 6 to 9 cm. long, long-acuminate, often hastate-lobate; peduncles elongate, 1 to 5-flowered; corolla 5 to 6 cm. long.

30. **Ipomoea robinsonii** House, Ann. N. Y. Acad. Sci. **18**: 257. 1908.
Type from Cuernavaca, Morelos.
Woody glabrous vine; leaves elliptic-oblong, 6 to 8 cm. long, obtuse; peduncles short, 1-flowered; corolla 6 to 8 cm. long.

31. **Ipomoea dimorphophylla** Greenm. Proc. Amer. Acad. **33**: 482. 1898.
Morelos and Oaxaca; type from Cuernavaca, Morelos.
Slender vine, fruticose below, more or less pubescent; leaves ovate-cordate, 4 to 10 cm. long, entire or lobate; peduncles short, 1 or several-flowered; corolla 6 to 8 cm. long.

8. TURBINA Raf. Fl. Tellur. 4: 81. 1836.

1. **Turbina corymbosa** (L.) Raf. Fl. Tellur. 4: 81. 1836.
Convolvulus corymbosus L. Syst. Nat. ed. 10. 923. 1759.
Convolvulus sidaefolius H. B. K. Nov. Gen. & Sp. **3**: 99. 1819.
Ipomoea sidaefolia Choisy, Mém. Soc. Phys. Hist. Nat. Genève **6**: 459. 1833.
Ipomoea antillana Millsp. Field Mus. Bot. **2**: 84. 1900.
Sinaloa to Tamaulipas, Yucatán, Tabasco, and Oaxaca. Widely distributed in tropical America.
Woody vine; leaves long-petiolate, broadly ovate-cordate, 4 to 8 cm. long, short-acuminate, entire, glabrous or pubescent; peduncles few or many-flowered, sepals scarious, about 1 cm. long; corolla white, campanulate, 2 to 3 cm. long; stamens included; seed 1, finely pubescent. "Pascua," "flor de Pascua" (Tabasco); "aguinaldo de Pascua" (Cuba); "campanilla" (El Salvador).

143. POLEMONIACEAE. Jacob's-ladder Family.

Reference: Brand in Engl. Pflanzenreich IV. 250. 1907.
Shrubs or usually herbs; leaves alternate or opposite, entire, dentate, pinnatifid, or palmatifid; flowers perfect, terminal or axillary; calyx 5-lobate, inferior; corolla gamopetalous; stamens 5, inserted on the corolla; style filiform, with 3 stigmas; fruit a capsule, 3-celled, luculicidal.

Several genera of the family are represented in Mexico only by herbaceous species.

Corolla regular, not bilabiate.....1. **GILIA.**
Corolla bilabiate.
  Calyx whitish-membranceous below the sinuses.....2. **LOESELIA.**
  Calyx green, herbaceous.....3. **BONPLANDIA.**

1. **GILIA** Ruiz & Pav. Fl. Peruv. Chil. Prodr. 25. 1794.

Shrubs or usually herbs; leaves opposite or alternate, entire or divided; flowers solitary or in thyrsiform panicles; corolla usually salverform, the limb 5-lobate; stigmas 3, filiform; capsule loculicidally 3-valvate.

Numerous herbaceous species occur in northern Mexico.

Leaves alternate.
  Leaves linear, entire.....1. G. palmeri.
  Leaves pinnatifid.
    Lobes of the corolla much longer than the tube.....2. G. rigidula.
    Lobes of the corolla shorter than the tube.....3. G. gloriosa.
Leaves opposite.
  Lobes of the leaves linear, not rigid.....4. G. floribunda.
  Lobes of the leaves acerose, rigid.....5. G. veatchii.

1. **Gilia palmeri** S. Wats. Proc. Amer. Acad. 24: 61. 1889.

Baja California; type from Los Angeles Bay.

Plants essentially annual but sometimes becoming suffrutescent below, pubescent; leaves 3.5 cm. long or less; flowers slender-pedicellate; corolla violaceous, about 1 cm. long.

2. **Gilia rigidula** Benth. in DC. Prodr. 9: 312. 1845.

Gilia rigidula acerosa A. Gray, Proc. Amer. Acad. 8: 280. 1870.

Chihuahua to San Luis Potosí, Zacatecas, and Durango. Western Texas to Arizona; type from San Antonio, Texas.

Plants 30 cm. high or less, usually herbaceous but often woody; leaves pinnatifid or bipinnatifid, the lobes linear or acerose, sharp-pointed; corolla blue, 3.5 cm. broad or less, the tube very short.

Gilia rigidula acerosa is a form with acerose, very stiff leaf segments.

3. **Gilia gloriosa** T. S. Brandeg. Proc. Calif. Acad. II. 2: 184. *pl. 9.* 1889.

Baja California; type from Ubi.

Densely branched shrub, about 1 meter high, forming broad rounded clumps, glandular-pubescent; leaves rigid, the lobes acerose; corolla 3 to 4 cm. long, pale pink or nearly white.

4. **Gilia floribunda** A. Gray, Proc. Amer. Acad. 8: 267. 1870.

Mountains of Baja California and Chihuahua. New Mexico to southern California.

Plants about 30 cm. high, fruticose at base, slender, pubescent; leaves parted to the base, the lobes 2 cm. long or less, spreading or reflexed; flowers corymbose-cymose at the ends of the branches; corolla white, 1 to 1.5 cm. long.

5. **Gilia veatchii** Parry; Greene, Bull. Calif. Acad. 2: 198. 1885.

Cedros Island, Baja California.

Densely branched shrub, 60 cm. high or less, with shredded bark; leaves parted to the base, 7 mm. long or less, glandular-pubescent; corolla about 1 cm. long, ochroleucous, purplish outside.

2. LOESELIA L. Sp. Pl. 628. 1753.

Plants annual or perennial, herbaceous or often woody, at least at base; leaves alternate or opposite, entire, pinnatifid, or dentate; flowers axillary; corolla more or less bilabiate, tubular or salverform; style exserted; seeds 3 to many.

The species listed here are the only ones known.

Leaves narrowly linear and entire, or pinnatifid into linear lobes; bracts inconspicuous.
- Leaves pinnatifid ..... 1. L. havardii.
- Leaves entire.
  - Stamens exserted ..... 2. L. tenuifolia.
  - Stamens not exserted.
    - Corolla tube much exceeding the calyx ..... 3. L. guttata.
    - Corolla tube scarcely exceeding the calyx ..... 4. L. effusa.

Leaves broader than linear or, if linear, dentate; bracts large and conspicuous.
- Corolla normally red ..... 5. L. mexicana.
- Corolla blue or white.
  - Flowers solitary ..... 6. L. pumila.
  - Flowers mostly in several-flowered inflorescences.
    - Bracts scarious, not green, entire ..... 7. L. purpusii.
    - Bracts green and herbaceous or, if scarious, dentate.
      - Bracts all linear-lanceolate ..... 8. L. glandulosa.
      - Bracts all or mostly ovate.
        - Leaves mostly cordate-clasping ..... 9. L. amplectens.
        - Leaves not cordate-clasping.
          - Stamens pilose ..... 10. L. scariosa.
          - Stamens glabrous.
            - Flowers partly solitary and partly in 2 to 4-flowered racemes ..... 11. L. caerulea.
            - Flowers capitate ..... 12. L. ciliata.

1. Loeselia havardii A. Gray, Proc. Amer. Acad. **19**: 87. 1883.

Gilia havardii A. Gray, Syn. Fl. ed. 2. **2**[1]: 411. 1886.

Western Texas, the type from Presidio del Norte, on the Rio Grande, and doubtless occurring on the Mexican side of the river.

Plants perennial, fruticose below, villous; lobes of the leaves sharp-pointed; flowers pedicellate; corolla purplish, 12 mm. long, the tube twice as long as the calyx.

2. Loeselia tenuifolia A. Gray, Proc. Amer. Acad. **11**: 86. 1875.

Gilia tenuifolia A. Gray, Syn. Fl. ed. 2. **2**[1]: 411. 1886.

Southern California, the type from the Cantillas Mountains, and doubtless extending into northern Baja California.

Plants 30 cm. high or less, woody at base, nearly glabrous; leaves about 15 mm. long; flowers pedicellate; corolla red, about 2 cm. long, the tube more than twice as long as the calyx, the lobes tridentate.

3. Loeselia guttata A. Gray, Proc. Amer. Acad. **20**: 302. 1885.

Gilia guttata A. Gray, Syn. Fl. ed. 2. **2**[1]: 411 1886.

Type from northern Baja California.

Plants 40 cm. high or less, woody at base, glabrous; corolla purplish, 15 to 20 mm. long, the lobes tridentate.

4. **Loeselia effusa** A. Gray, Proc. Amer. Acad. 11: 86. 1875.
Gilia dunnii Kellogg, Pacif. Rural Press, May 31, 1879.
Northern Baja California. Southern California.
Plants 30 cm. high or less, nearly glabrous; leaves about 8 mm. long; corolla purplish, 12 mm. long, the lobes entire.

5. **Loeselia mexicana** (Lam.) Brand in Engl. Pflanzenreich IV. 250: 174. 1907.
Hoitzia mexicana Lam. Encycl. 3: 134. 1789.
Hoitzia coccinea Cav. Icon. Pl. 4: 44. *pl. 365.* 1797.
Cantua hoitzia Willd. Sp. Pl. 1: 878. 1797.
Loeselia coccinea Don, Hist. Dichl. Pl. 4: 247. 1837.
Chihuahua and Sinaloa to Oaxaca, Puebla, and San Luis Potosí.
Shrub, 1.5 meters high or less, glandular-pubescent; leaves subsessile, lanceolate to lance-ovate, obtuse or acute, cuneate at base, sharply serrate; flowers solitary; corolla about 2.5 cm. long, the lobes entire, much shorter than the tube; calyx lobes entire. "Huachichile" "huichichile," "guachichile" (Sinaloa, Aguascalientes, Jalisco, San Luis Potosí, Durango; from the Nahuatl *huitzitzil-xochitl*, "hummingbird-flower"); "espinosilla" (Guanajuato, Querétaro, Mexico, Tepic, San Luis Potosí, Oaxaca); "hierba de San Antonio" (Durango); "intzquilitzin" (*Seler*); "flor del chupamirto," "flor de colibrí" (*Robelo*); "cuachile" (*Ramírez*); "chuparrosa" (Mexico); "huicicilo" (*Ramírez*); "mirto silvestre" (*Ramírez*); "huitzizilin" (Mexico, *Bárcena*); "hierba de la virgen" (*Flores*).
The shrub is a handsome one when in full flower. A form with yellow flowers, growing about the City of Mexico, is *L. mexicana lutea* Brand.[1] A specimen from Tlaxcala is said to have nearly white flowers.
A decoction of the leaves is much used in Mexico as a remedy for fevers, and is said to have emetic, purgative, diuretic, and sudorific properties. It is employed also as a wash to prevent falling of the hair. The plant is said to contain an alkaloid, loeseline. The early inhabitants used the plant like soap, crushing it in water until a suds was formed.[2]

6. **Loeselia pumila** (Mart. & Gal.) Walp. Repert. Bot. 6: 527. 1846.
Hoitzia pumila Mart. & Gal. Bull. Acad. Brux 12[2]: 275. 1845.
Loeselia intermedia Loesener, Bull. Herb. Boiss. 7: 567. 1899.
San Luis Potosí to Guerrero, Puebla, and Oaxaca.
Plants glandular-pilose, annual but sometimes suffrutescent, 45 cm. high or less; leaves short-petiolate, oblong to broadly ovate; calyx lobes 5-dentate; corolla blue or bluish, about 1 cm. long, the lobes entire.

7. **Loeselia purpusii** T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 389. 1909.
Type from San Luis Tultitlanapa, Puebla.
Small shrub, sparsely puberulent; leaves oblong-elliptic, obtuse or acute, cuneate at base, sharply serrate, lustrous, subsessile; calyx lobes minutely serrulate; corolla about 2 cm. long, pale purple.

8. **Loeselia glandulosa** (Cav.) Don, Hist. Dichl. Pl. 4: 248. 1837.
Hoitzia glandulosa Cav. Icon. Pl. 4: 45. *pl. 367.* 1797.
Hoitzia cervantesii H. B. K. Nov. Gen. & Sp. 3: 128. 1819.
Hoitzia conglomerata H. B. K. Nov. Gen. & Sp. 3: 128. 1819.
Hoitzia capitata Willd.; Roem. & Schult. Syst. Veg. 4: 370. 1819.
Hoitzia spicata Willd.; Roem. & Schult. Syst. Veg. 4: 370. 1819.
Hoitzia nepetifolia Schlecht. & Cham. Linnaea 6: 385. 1831.

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[1] In Engl. Pflanzenreich IV. 250: 176. 1907.
[2] See Marcial Oropeza, La espinosilla, Naturaleza 3: 3–7. 1876.

Hoitzia elata Hook. & Arn. Bot. Beechey Voy. 441. 1841.
Hoitzia ramosissima Mart. & Gal. Bull. Acad. Brux. **12**[2]: 273. 1845.
Hoitzia scabra Mart. & Gal. Bull. Acad. Brux. **12**[2]: 274. 1845.

Sonora and Chihuahua to Veracruz and Chiapas. Southern Arizona; Guatemala to Colombia and Venezuela.

Plants pubescent or glabrate, annual but often suffrutescent, slender, 1 meter high or less; leaves lanceolate or ovate, sharply serrate, short-petiolate; corolla bluish, about 15 mm. long. "Verbena" (Chiapas); "clarincillo silvestre" (Guatemala).

Brand separates several varieties, which differ chiefly in pubescence.

9. Loeselia amplectens (Hook. & Arn.) Benth. in DC. Prodr. **9**: 320. 1845.
Hoitzia amplectens Hook. & Arn. Bot. Beechey Voy. 441. 1841.
Loeselia cordifolia Hemsl. & Rose in Hook. Icon. Pl. **26**: *pl. 2551.* 1899.

Tepic to Guerrero; type collected between San Blas and Tepic.

Plants slender, puberulent or glabrate, chiefly herbaceous; leaves ovate-cordate or lance-cordate, sessile, serrate, prominently veined; bracts large and leaflike; corolla white or purplish, about 15 mm. long.

10. Loeselia scariosa (Mart. & Gal.) Walp. Repert. Bot. **6**: 527. 1846.
Hoitzia scariosa Mart. & Gal. Bull. Acad. Brux. **12**[2]: 274. 1845.
Loeselia greggii S. Wats. Proc. Amer. Acad. **18**: 117. 1883.

Chihuahua and Coahuila to Puebla; type from Puebla.

Plants slender, pubescent, suffrutescent; leaves oblong to ovate, sessile or short-petiolate, aristate-dentate, cuneate at base; corolla bluish or pink, about 1 cm. long. "Huachichile" (Coahuila).

Palmer reports that in Coahuila the plant is used as a remedy for ague.

11. Loeselia caerulea (Cav.) Don, Hist. Dichl. Pl. **4**: 248. 1837.
Hoitzia caerulea Cav. Icon. Pl. **4**: 45. *pl. 366.* 1797.
Loeselia rupestris Benth. in DC. Prodr. **9**: 319. 1845.
Hoitzia floribunda Mart. & Gal. Bull. Acad. Brux. **12**[2]: 275. 1845.

Chihuahua to Jalisco and Oaxaca.

Plants pubescent, annual but often suffrutescent, 45 cm. high or less; leaves linear-lanceolate to ovate, sessile, dentate; bracts purplish-reticulate; corolla blue, 10 to 12 mm. long. "Banderilla," "jarritos," "guachichil" (*Brand*).

12. Loeselia ciliata L. Sp. Pl. 628. 1753.
Hoitzia aristata H. B. K. Nov. Gen. & Sp. **3**: 128. 1819.
Hoitzia loeselia Spreng. Syst. Veg. **1**: 626. 1825.
Loeselia involucrata Don, Hist. Dichl. Pl. **4**: 248. 1837.
Hoitzia lupulina Hook. & Arn. Bot. Beechey Voy. 441. 1841.

Baja California to Chihuahua, Veracruz, and Guerrero; type from Veracruz. Central America.

Plants pubescent or glabrate, slender, annual but sometimes suffrutescent; leaves mostly ovate or broadly ovate, petiolate, dentate; bracts large and leaflike, cordate, aristate-dentate; corolla blue or white, about 1 cm. long. "Lenteja," "lentejilla" (El Salvador).

Loeselia involucrata is maintained by Brand as distinct from *L. ciliata*, the two with *L. amplectens* forming a "species collectiva." He states that in *L. ciliata* the outer bracts are cordate but not clasping, while in *L. involucrata* they are deeply cordate-clasping. There does not appear to be any essential difference between the two forms.

3. **BONPLANDIA** Cav. Anal. Hist. Nat. 2: 131. 1800.

Plants suffrutescent, viscid-pubescent; lower leaves alternate, the upper opposite; flowers geminate, pedicellate; calyx green; corolla bilabiate, the lobes equaling or shorter than the tube; stamens exerted; capsule 1 to 3-seeded.

Only two species are known.

Leaves linear or pinnate-lobate, with linear lobes----------1. **B. linearis.**
Leaves and their lobes lanceolate or broader----------2. **B. geminiflora.**

1. Bonplandia linearis Robinson, Proc. Amer. Acad. 43: 24. 1907.

Type from Coru, Michoacán, altitude 1,800 meters; perhaps also in Durango.

Plants glandular-pilose; upper leaves linear, the lower pinnatifid into linear lobes; corolla purplish, about 2 cm. long.

2. Bonplandia geminiflora Cav. Anal. Hist. Nat. 2: 131. 1800.

Caldasia heterophylla Willd. Hort. Berol. *pl. 71.* 1807.

Sinaloa to San Luis Potosí, Morelos, and Michoacán. Guatemala.

Plants a meter high or less, suffrutescent, ill-scented; lower leaves ovate or lanceolate, lyrate-pinnatifid, serrate, acuminate, petiolate; corolla purplish, 2 to 2.5 cm. long, glabrous.

144. HYDROPHYLLACEAE. Waterleaf Family.

Reference: Brand in Engl. Pflanzenreich IV. 251. 1913.

Shrubs or small trees, or usually herbs; leaves alternate or opposite, simple (in the genera here listed); flowers perfect, regular, terminal and axillary, often in scorpioid cymes; calyx 5-parted, inferior, often accrescent in fruit; corolla gamopetalous, 5-lobate; stamens 5, inserted on the corolla; styles 1 or 2, the stigmas 2, capitate; fruit a capsule, bivalvate, 1-celled, with 2 parietal placentae.

Several genera are represented in Mexico only by herbaceous species.

Stamens equal in length; leaves mostly 10 cm. wide or more; plants usually with stinging hairs----------1. **WIGANDIA.**
Stamens unequal; leaves much smaller; plants without stinging hairs.
Capsule crustaceous; leaves often dentate and glutinous--2. **ERIODICTYON.**
Capsule membranaceous; leaves entire, not glutinous----3. **CONANTHUS.**

1. **WIGANDIA** H. B. K. Nov. Gen. & Sp. 3: 127. 1819.

Shrubs, trees, or large herbs; leaves very large, simple; flowers in scorpioid cymes; calyx 5-parted to base; corolla funnelform-campanulate; stamens slightly exserted; styles 2, elongate; ovules very numerous; seeds more or less winged.

Style only slightly longer than the calyx----------1. **W. caracasana.**
Style twice as long as the calyx.
Stems usually hispid with stinging hairs; calyx hispid-------2. **W. kunthii.**
Stems tomentose; calyx not hispid----------3. **W. scorpioides.**

1. Wigandia caracasana H. B. K. Nov. Gen. & Sp. 3: 100. 1819.

Wigandia macrophylla Schlecht. & Cham. Linnaea 6: 382. 1831.

San Luis Potosí, Veracruz, Mexico, and Oaxaca. Guatemala to Colombia and Venezuela; type from Caracas, Venezuela.

Plants 3 meters high or less, densely pubescent and usually hispid; leaves ovate to oval, 40 cm. long or less, obtuse, subcordate at base, coarsely crenate, tomentose beneath; sepals 10 to 15 mm. long; corolla purplish, longer than the

sepals. "Hoja de San Pablo," "palo de San Pablo," "San Pablo" (Oaxaca); "tabaco cimarrón" (*Seler*); "chocón" (Guatemala); "tabaquillo" (El Salvador); "pringamoza" (Colombia).

2. **Wigandia kunthii** Choisy, Mém. Soc. Phys. Hist. Nat. Genève **6**: 116. 1833.

Sinaloa and Durango to Chiapas. Central America.

Shrub or tree, 5 meters high or less; leaves oval or rounded, 40 cm. long or less, rounded or obtuse at apex, cordate at base, coarsely crenate, tomentose beneath; sepals 6 to 10 mm. long; corolla about 1.5 cm. long, bluish or white; capsule hispid. "Quemadora" (Jalisco, Sinaloa); "ortiga" (Jalisco, Michoacán, Guerrero, Oaxaca, Mexico, Costa Rica); "tabaco cimarrón" (Mexico, Puebla); "ortiga grande" (Guanajuato, Oaxaca); "sosa" (*Ramírez*); "ortiga prieta," "chichicastle" (*Brand*); "tabacón" (El Salvador).

The long hairs sting the skin painfully like those of a nettle. The plant has been employed in Mexico as a remedy for syphilitic affections, and a decoction of the leaves in Costa Rica for rheumatism.

3. **Wigandia scorpioides** Choisy in DC. Prodr. **10**: 184. 1846.

Veracruz and Oaxaca.

Small tree, the young branches densely white-tomentose; leaves ovate-oval or rounded-oval, 30 cm. long or less, rounded at apex, cordate at base, crenate or crenate-lobate, very densely whitish-tomentose beneath; sepals about 1 cm. long, the corolla about twice as long. "Consuelda mayor" (*Urbina*).

2. ERIODICTYON Benth. Bot. Voy. Sulph. 35. 1844.

Reference: Abrams & Smiley, Taxonomy and distribution of *Eriodictyon*, Bot. Gaz. **60**: 115–133. 1915.

Shrubs; leaves alternate, entire or dentate, reticulate-veined; flowers in scorpioid racemes; calyx 5-parted to base; corolla funnelform or subcampanulate, pubescent; stamens included, barbate at base; styles 2; ovules 6 to 7 on each placenta.

The species are known in California as "hierba santa." The dried leaves are official in the U. S. Pharmacopoeia, and are used in the treatment of asthma, chronic bronchitis, and inflammation of the genito-urinary tract. They contain two aromatic resins and tannic acid. The plants have long been employed in California as a bitter tonic and a stimulant balsamic expectorant, and sometimes as a remedy for rheumatism. The Coahuilla Indians of southern California applied the leaves as poultices to sores upon men and beasts, and bathed sore parts or fatigued limbs with a decoction of the plant.

Leaves sessile, usually hirsute on the upper surface_____**1. E. sessilifolium.**
Leaves petiolate, not hirsute.
  Branches tomentose, tardily if ever glabrate_____**2. E. lanatum.**
  Branches glabrous except sometimes in the inflorescence.
    Leaves linear-lanceolate, not revolute; calyx densely pubescent.
      3. E. trichocalyx.
    Leaves narrowly linear, revolute; calyx sparsely pubescent.
      4. E. angustifolium.

1. **Eriodictyon sessilifolium** Greene, Bull. Calif. Acad. **1**: 201. 1885.

Northern Baja California; type from Bahía de Todos Santos.

Shrub, 1 to 2.5 meters high, the branches hirsute; leaves oblong or lance-oblong, 6 to 12 cm. long, obtuse or acute, truncate or cordate at base, coarsely dentate, white-tomentose beneath; corolla lilac-purple, 12 mm. long.

2. **Eriodictyon lanatum** (Brand) Abrams, Bot. Gaz. **60**: 126. 1915.
Eriodictyon californicum subsp. *australe* var. *lanatum* Brand in Engl. Pflanzenreich IV. **251**: 142. 1913.

Northern Baja California. Southern California; type collected between Campo and Jacumba.

Shrub, 2 meters high or less; leaves linear-lanceolate, 4 to 8 cm. long, acute at each end, subrevolute, entire or dentate, white-tomentose beneath; corolla pale purplish blue or nearly white, 7 to 8 mm. long.

3. **Eriodictyon trichocalyx** Heller, Muhlenbergia **1**: 108. 1904.

Northern Baja California. Southern California; type from San Bernardino Mountains.

Glutinous shrub, 0.5 to 1.5 meters high; leaves 5 to 10 cm. long, acute at base and apex, coarsely dentate or sometimes entire, tomentulose beneath; corolla white, 5 to 6 mm. long.

4. **Eriodictyon angustifolium** Nutt. Journ. Acad. Phila. II. **2**: 181. 1848.

Mountains of Baja California. Arizona, Utah, and Nevada; type from Arizona.

Glutinous shrub, 2 meters high or less; leaves 5 to 10 cm. long, glabrous above, white-tomentose beneath, entire; corolla about 5 mm. long.

3. CONANTHUS S. Wats. in King, Geol. Expl. 40th Par. **5**: 256. 1871.

Plants usually herbaceous but sometimes suffruticose; leaves alternate, entire; flowers solitary or in scorpioid cymes; calyx 5-parted; corolla cylindric, campanulate, or funnelform; styles 2, free or connate; ovules numerous.

Numerous herbaceous species occur in Mexico.

Styles connate. Leaves linear----------1. C. stenophyllus.
Styles distinct.
  Leaves elliptic or lanceolate----------2. C. sericeus.
  Leaves linear.
    Corolla cylindric, 9 mm. long----------3. C. flavescens.
    Corolla salverform, 12 mm. long----------4. C. purpusii.

1. **Conanthus stenophyllus** (A. Gray) Standl.
Nama stenophyllum A. Gray; Hemsl. Biol. Centr. Amer. Bot. **2**: 361. 1882.

Coahuila, Zacatecas, and San Luis Potosí; type from San Lorenzo de la Laguna, Coahuila.

Plants 30 cm. high or less, with thick woody branches below, pubescent; leaves 10 to 17 mm. long; flowers sessile or short-pedicellate, in terminal leafy cymes; corolla 9 mm. long.

2. **Conanthus sericeus** (Willd.) Standl.
Nama sericeum Willd.; Roem. & Schult. Syst. Veg. **6**: 189. 1820.
Nama longiflorum Choisy, Mém. Soc. Phys. Hist. Nat. Genève **6**: 114. 1833.

San Luis Potosí and Hidalgo.

Plants tall and slender, erect, the stems whitish-hirsutulous; leaves 2.5 to 4.5 cm. long, acute, whitish-sericeous especially beneath; corolla 2 to 2.8 cm. long.

3. **Conanthus flavescens** (T. S. Brandeg.) Standl.
Nama flavescens T. S. Brandeg. Zoe **5**: 254. 1908.

Coahuila; type from Parras.

Plants suffrutescent, 30 cm. high or more, hirsute and glandular-viscid above; leaves 1.5 to 2 cm. long; sepals linear, 5 to 6 mm. long.

4. **Conanthus purpusii** (T. S. Brandeg.) Standl.

Nama purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 186. 1911.

Type from Movano, Coahuila.

Plants suffrutescent, white-hirsute; leaves sessile, 2.5 cm. long or less, obtuse; sepals linear, 6 to 7 mm. long; corolla bluish purple.

145. BORAGINACEAE. Borage Family.

Trees, shrubs, or herbs; leaves estipulate, entire or toothed, alternate or rarely opposite; flowers perfect, regular, usually in cymes, the branches commonly scorpioid; calyx inferior, usually persistent, tubular or campanulate; corolla gamopetalous, subrotate to funnelform or salverform, the limb commonly 5-lobate; stamens as many as the corolla lobes and alternate with them, inserted on the corolla; ovary normally of 2 2-ovulate carpels, sometimes 4-celled; style entire or once or twice bifid; fruit drupaceous or of 4 nutlets.

Several genera are represented in Mexico only by herbaceous species.

Style twice bifid----1. **CORDIA.**
Style entire or once bifid.
  Flowers in cymes, these usually paniculate.
    Calyx closed in bud, in anthesis valvate, 2 to 5-lobate---2. **BOURRERIA.**
    Calyx not closed in bud, 5-parted----3. **EHRETIA.**
  Flowers in scorpioid spikes or racemes, these often cymose, or the flowers in terminal heads or solitary or clustered in the axils.
  Flowers in terminal heads or solitary or clustered in the axils.
4. COLDENIA.
  Flowers in scorpioid spikes or racemes.
    Fruit drupaceous----5. **TOURNEFORTIA.**
    Fruit dry, separating into 2 or 4 nutlets----6. **HELIOTROPIUM.**

1. CORDIA L. Sp. Pl. 190. 1753.

Trees or shrubs; leaves mostly alternate, entire or dentate; flowers in cymes, heads, or spikes, small or large; calyx tubular or campanulate, often striate, 3 to 5-dentate; corolla funnelform, salverform, or campanulate, usually 4 to 6-lobate, sometimes with as many as 18 lobes; style twice bifid; fruit drupaceous.

The following vernacular names have been reported for plants of the genus whose specific identity is uncertain: "Palo negro" (*Ramírez*); "cuéramo" (Michoacán); "candelero" (Tabasco); "rosadillo" (Oaxaca); "rasca-viejo" (Michoacán).

Calyx conspicuously 10-striate or sulcate.
  Calyx 3 to 4 mm. long, campanulate.
    Corolla tube exserted----1. **C. alba.**
    Corolla tube not exserted----2. **C. diversifolia.**
  Calyx 5 mm. long or more, usually cylindric.
    Leaves finely stellate-pubescent beneath----3. **C. alliodora.**
    Leaves not stellate-pubescent.
      Leaves 1 to 3 cm. long.
        Leaves entire----4. **C. seleriana.**
        Leaves coarsely dentate----5. **C. greggii.**

Leaves mostly 5 cm. long or much larger.
Leaves densely pilose, tomentose, or sericeous beneath, even in age.
Leaves densely whitish-sericeous beneath——6. C. elaeagnoides.
Leaves tomentose or pilose beneath with loose spreading hairs.
Flowers 2 cm. long——7. C. guerkeana.
Flowers 2.5 to 4.5 cm. long.
Leaves densely tomentose beneath——8. C. boissieri.
Leaves hispidulous beneath with short, very stiff hairs.
9. C. morelosana.
Leaves glabrous beneath in age except along the costa, or with small inconspicuous hairs along the veins.
Calyx lobes subulate or narrowly deltoid, acute.
10. C. gerascanthus.
Calyx lobes broadly ovate or deltoid, obtuse.
Calyx 6 to 7 mm. long, minutely puberulent——11. C. igualensis.
Calyx 9 to 14 mm. long, densely pubescent.
Slender portion of the corolla tube much exserted from the calyx——12. C. tinifolia.
Slender portion of the corolla tube not or scarcely exserted.
13. C. sonorae.

Calyx neither striate nor sulcate.
Flowers in cymes.
Corolla 12 to 16-lobate——14. C. dodecandra.
Corolla 5 to 8-lobate.
Flowers 6 mm. long or less——15. C. chiapensis.
Flowers more than 1 cm. long.
Calyx 5 to 6 mm. long; leaves tomentose beneath, at least when young——16. C. microsebestena.
Calyx 8 to 14 mm. long; leaves not tomentose beneath.
Leaves setulose-hirtellous beneath; flowers mostly 3.5 to 4.5 cm. long——17. C. sebestena.
Leaves minutely scaberulous or glabrate beneath; flowers less than 3 cm. long——4. C. seleriana.

Flowers in spikes or globose heads.
Flowers in dense globose heads.
Leaves stellate-pubescent on the upper surface.
Calyx lobes filiform——18. C. pringlei.
Calyx lobes short, obtuse——19. C. stellata.
Leaves without stellate pubescence.
Flower heads paniculate——20. C. corymbosa.
Flower heads solitary.
Calyx lobes subulate or filiform.
Stems and peduncles hispid with spreading hairs.
21. C. urticacea.
Stems and peduncles puberulent or tomentulose, often also appressed-setulose.
Corolla 1.5 cm. long or less.
Leaves sparsely strigose or strigillose——22. C. limicola.
Leaves setose-scabrous——23. C. globosa.
Corolla 2 cm. long or more.
Leaves acute or attenuate at base——24. C. perlonga.
Leaves mostly obtuse or rounded at base.
25. C. appendiculata.

Calyx lobes ovate or deltoid, acute or acuminate.
Corolla 12 to 20 mm. long----------26. C. podocephala.
Corolla 7 mm. long or less.
Calyx lobes mucronate-acuminate----------27. C. ambigua.
Calyx lobes obtuse or merely acute----------28. C. cana.
Flowers in dense or interrupted spikes.
Leaves ovate to broadly ovate or elliptic----------29. C. ferruginea.
Leaves linear to oblong----------30. C. cylindrostachya.

1. **Cordia alba** (Jacq.) Roem. & Schult. Syst. Veg. 4: 466. 1819.

Varronia alba Jacq. Enum. Pl. Carib. 14. 1760.

Michoacán to Tamaulipas, Veracruz, and Chiapas. West Indies; Guatemala to Colombia and Venezuela.

Shrub or small tree, usually 4 to 8 meters high, with thick, brownish or grayish, fissured bark, the branchlets sparsely or densely setulose; leaves very variable in size and shape, mostly ovate to rounded and 5 to 12 cm. long, rounded to acuminate at apex, scabrous or smooth above, glabrate beneath in age; flowers in large open cymes; corolla white or yellow, about 1 cm. long; fruit white, about 1 cm. long. "Zazamil" (Oaxaca, Guerrero); "gulabere" (Oaxaca); "vavos" (*Seler*); "uvita mocosa" (Colombia); "varía blanca," "ateje blanco," "atejo amarillo," "uva gomosa," "capá blanca" (Cuba); "tigüilote," "tigüilote negro," "cebito" (El Salvador); "caujaro" (Colombia); "uvillo," "uvero," "goma" (Panama).

The wood is said to be hard and strong, yellow, with a specific gravity of about 0.78, and to be used in carpentry. The leaves and flowers are reported to have emollient properties and to be used for treating affections of the chest. A decoction of the flowers is sometimes employed for inducing perspiration. In El Salvador a French physician formerly prepared from the charcoal a preparation which was much used for treating affections of the stomach. The fruit is employed in Oaxaca for coagulating indigo. It is white, transparent, mucilaginous, and extremely sweet, and is often eaten. The viscid juice is used in El Salvador for fastening the wrappers of cigars.

2. **Cordia diversifolia** Pavón; DC. Prodr. 9: 474. 1845.

Sinaloa to Colima.

Large shrub or small tree, the branchlets scabrous and sometimes hirsute; leaves obovate to rounded-obovate, 6 to 10 cm. long, rounded to acute at apex, broadly cuneate or obtuse at base, remotely mucronate-serrate above the base, scabrous above, setulose-scabrous beneath; flowers in small cymes, sessile, secund upon the branches; calyx tubular-campanulate, striate, 3 mm. long, scabrous, obtusely 5-dentate; corolla yellow, the lobes obtuse, reflexed, equaling or shorter than the calyx, the throat hirsute.

3. **Cordia alliodora** (Ruiz & Pav.) Cham. Linnaea 8: 121. 1833.

Cordia gerascanthus Jacq. Stirp. Amer. 43. 1763. Not *C. gerascanthus* L. 1759.

Cerdana alliodora Ruiz & Pav. Fl. Peruv. Chil. 2: 47. *pl. 184.* 1799.

Sinaloa to Oaxaca and Tabasco. West Indies; Central and South America.

Tree, 7 to 20 meters high, the trunk 50 cm. or more in diameter, the bark grayish, fissured; leaves mostly elliptic-oblong, 10 to 20 cm. long, acute or acuminate, finely stellate-pubescent, entire; flowers white, fragrant, in large panicles; calyx about 5 mm. long, the corolla twice as long; wood close-grained, the sapwood thick, light brown, the heartwood slightly darker, the specific gravity reported as ranging from 0.574 to 0.700. "Bojón," "bojón blanco," "bojón prieto" (Tabasco); "tambor" (Michoacán); "hormiguero"

(Michoacán, Guerrero, Oaxaca); "amapa prieta" (Sinaloa); "palo de rosa" (Oaxaca, Cuba, Porto Rico) "palo María" (Guerrero, *Ramírez*); "laurel" (Panama, Costa Rica, El Salvador, Guatemala, Honduras); "solera" (Colombia); "laurel macho" (Nicaragua); "capá prieta" (Porto Rico, Cuba); "varía," "capá roja" (Cuba); "canjaro," "pardillo" (Venezuela); "suchicahue" (*Reko*); "árbol del ajo" (Peru); "laurel blanco" (El Salvador); "canalete" (Colombia).

The wood is highly valued for carpenter and cabinet work, and is used for beams, flooring, ceiling, and finer work. The smaller branches are sometimes employed for making barrel hoops. The forks of the young twigs are almost always enlarged by hollow swellings, which afford shelter for fierce ants, hence the name "hormiguero." The fruit is edible. A decoction of the leaves is employed as a tonic and stimulant, especially in the case of catarrh and affections of the lungs, and an ointment made with the pulverized seeds has been used in the West Indies as a remedy for cutaneous diseases. The fresh bark is reported to have an odor suggestive of garlic.

4. **Cordia seleriana** Fernald, Proc. Amer. Acad. **36**: 498. 1901.

Michoacán to Oaxaca; type from Huilotepec, Oaxaca.

Shrub or small tree; leaves ovate to suborbicular, scabrous or hispidulous; cymes few-flowered; calyx tubular-campanulate, 1 cm. long or less; corolla white, 1.5 to 3 cm. long.

5. **Cordia greggii** Torr. U. S. & Mex. Bound. Bot. 135. 1859.

Cordia greggii palmeri S. Wats. Proc. Amer. Acad. **24**: 61. 1889.

Cordia watsoni Rose, Contr. U. S. Nat. Herb. **1**: 89. 1890.

Baja California to Sinaloa, Durango, Zacatecas, and Coahuila; type from Bolsón de Mapimí, Durango.

Shrub, 1 to 3 meters high; leaves mostly ovate or obovate, rounded or obtuse at apex, obtuse or acute at base, coarsely dentate, very scabrous; flowers white, in few-flowered headlike cymes; calyx about 7 mm. long, the lobes subulate; corolla 1.5 to 3 cm. long. "Vara prieta" (Sinaloa); "San Juanito" (Durango, Sinaloa).

A decoction of the leaves is said to be used as a stimulant medicine.

6. **Cordia elaeagnoides** DC. Prodr. **9**: 474. 1845.

Michoacán to Chiapas; type from Chinitán, between Tehuantepec and Boca del Monte.

Tree, 6 to 10 meters high; leaves ovate to broadly elliptic, 8 to 17 cm. long, acuminate or long-acuminate, entire or nearly so, glabrous and smooth above; flowers creamy white, in large cymes; calyx 6 mm. long, whitish-sericeous, the teeth obtuse; corolla 2 cm. broad or larger. "Grisiñó" (Chiapas); "bocote," "gueramo" (Michoacán, Guerrero); "ocotillo meco" (Oaxaca).

The wood is said to be valuable for cabinet work.

7. **Cordia guerkeana** Loesener, Verh. Bot. Ver. Brandenb. **55**: 186. 1913.

Oaxaca; type from Totolapam.

Leaves oblong to broadly obovate or oval-oblong, 4.5 to 9 cm. long, obtuse or rounded at apex, entire or nearly so, glabrate above; flowers fragrant; calyx 10 to 12 mm. long, fulvous-tomentose, the teeth short, obtuse; corolla white, the tube more than twice as long as the calyx. "Laa-zaa-yi-xē" (*Seler*).

8. **Cordia boissieri** DC. Prodr. **9**: 478. 1845.

Coahuila to Tamaulipas and San Luis Potosí. Western Texas.

Shrub or small tree, 8 meters high or less, the trunk up to 20 cm. in diameter; bark thick, gray, ridged; leaves ovate to oblong, 8 to 12 cm. long,

obtuse, rounded or cordate at base, scabrous above, entire or nearly so; flowers in small dense cymes; calyx 1 cm. long, the teeth acute; corolla 3 to 4 cm. long, white, with yellow throat, the lobes crispate; fruit ovoid, 2.5 to 3 cm. long, reddish brown, shining, the flesh sweet; wood soft, close-grained, brown, its specific gravity about 0.68. "Anacahuite," "anacahuitl," "anacahuita" (Tamaulipas, Guanajuato, Nuevo León, Texas; from the Nahuatl *amacuahuitl*, "paper-tree"); "siricote" (Tamaulipas); "nacagüita" (Nuevo León); "trompillo" (Tamaulipas, Nuevo León); "nacahuite" (San Luis Potosí); "nacahuitl" (Nuevo León).

The tree is often planted for ornament and is very handsome when covered with flowers. The fruit is eaten by people but if eaten raw it said to cause dizziness, as if one were intoxicated. Domestic animals are fond of the fruit and hogs eat the seeds. The wood is of little value, but yokes and other articles are made from it. All parts of the plant are aromatic. Jelly made from the fruit is much used as a remedy for coughs and colds. A decoction of the leaves is a popular domestic remedy for rheumatism and is generally employed in the treatment of bronchial affections. About 1860 the wood attracted some attention in Germany as a possible remedy for tuberculosis and quantities of it were exported from Tampico. Analysis, however, showed that it did not possess important medicinal properties, and experience proved that no good results followed its use, consequently it was not long employed.

9. Cordia morelosana Standl., sp. nov.

Morelos; type from Cuernavaca (*Pringle* 8205; U. S. Nat. Herb. no. 354555).

Small tree; leaves petiolate, broadly elliptic or rounded, 3.5 to 6 cm. long, 2 to 4 cm. wide, rounded or apiculate at apex, obtuse or rounded at base, coriaceous, scabrous above, setose-hispidulous beneath, the venation very prominent and reticulate beneath; flowers in large dense cymes; calyx 13 mm. long, tubular, striate, densely pilose, the teeth short, obtuse; corolla about 3 cm. long, 5 or 6-lobate, the lobes rounded.

10. Cordia gerascanthus L. Syst. Nat. ed. 10. 936. 1759.

Cordia gerascanthoides H. B. K. Nov. Gen. & Sp. 3: 69. 1819.

Yucatán; reported from Tabasco. Greater Antilles.

Tree, 4 to 30 meters high; leaves lanceolate to elliptic-oblong, 5 to 12 cm. long, acute or acuminate, acute at base, entire, glabrous or nearly so; flowers white, fragrant, in dense cymes; calyx 7 to 10 mm. long, pilose or tomentulose; corolla about twice as long as the calyx. "Baría" (Tabasco, Quintana Roo, *Cienfuegos*); "bohom," "habeem" (Yucatán, Maya).

The wood is said to be strong and elastic and to be valuable for purposes of construction.

11. Cordia igualensis Bartlett, Proc. Amer. Acad. 44: 632. 1909.

Type from Iguala Canyon, Guerrero, altitude 760 meters.

Leaves elliptic, 12 to 18 cm. long, abruptly short-acuminate, acute at base, entire, glabrous above; flowers white, in large cymes; corolla 2.5 cm. long.

12. Cordia tinifolia Willd.; Roem. & Schult. Syst. Veg. 4: 800. 1819.

Tepic to Guerrero; type from Acapulco.

Tree, 4 to 15 meters high; leaves narrowly oblong to elliptic-oblong, 7 to 15 cm. long, acute or acuminate, acute to rounded at base, glabrous above; flowers white, in large or small cymes, sessile; corolla about 3 cm. long.

13. Cordia sonorae Rose, Contr. U. S. Nat. Herb. 1: 106. *pl. 9.* 1891.

Sonora to Guerrero; type from Alamos, Sonora.

Shrub or tree, 2 to 15 meters high; leaves oblong to elliptic, 5 to 11 cm. long, obtuse, coriaceous, scaberulous or glabrate above; flowers white, in small dense cymes; corolla 3 cm. long or less. "Asta," "palo de asta" (Sonora, Sinaloa).

Cordia langlassei Loesener,[1] the type of which came from the Río Coyaquilla, Michoacán or Guerrero, was described from leafless flowering branches. It is closely related to *C. sonorae* and probably a synonym.

14. Cordia dodecandra DC. Prodr. 9: 478. 1845.

Cordia heccaidecandra Loesener, Bot. Jahrb. Engler 36: Beibl. 80: 25. 105.

Yucatán and Chiapas. Guatemala.

Tree, 30 meters high or less; leaves oblong to oval or rounded, 6 to 13 cm. long, obtuse or rounded at base and apex, entire or nearly so, scabrous; flowers reddish yellow, in small cymes; calyx 1 to 1.5 cm. long; corolla about 5 cm. long; fruit 5 cm. long, greenish or yellowish, slightly acid. "Copté," "siricote" (Yucatán).

The tree is sometimes cultivated for its edible fruit. The wood is said to be hard and heavy, to take a fine polish, and to be used for making furniture. A decoction of the wood or bark is a domestic remedy for colds. The leaves are used for cleaning dishes and as a substitute for sandpaper.

15. Cordia chiapensis Fernald, Proc. Amer. Acad. 40: 52. 1904.

Type from Ocuilapa, Chiapas, altitude 1,020 to 1,140 meters.

Shrub with brown bark; leaves short-petiolate, oblong-lanceolate or ovate-lanceolate, 3 to 8 cm. long, acute or acuminate, acute at base, serrate, scabrous; cymes scorpioid, long-pedunculate, the flowers sessile; calyx 4 mm. long or less; fruit 6 mm. long.

16. Cordia microsebestena Loesener, Verh. Bot. Ver. Brandenb. 55: 187. 1913.

Oaxaca; type from La Mistequilla, Tehuantepec.

Leaves ovate to rounded, 2 to 6 cm. long, obtuse to acuminate, scaberulous above; cymes few-flowered; calyx 5 mm. long, 5 or 6-dentate; corolla white.

17. Cordia sebestena L. Sp. Pl. 190. 1753.

? *Cordia crispiflora* DC. Prodr. 9: 476. 1845.

Yucatán. Florida and West Indies.

Tree, 10 meters high or less, the trunk up to 15 cm. in diameter; bark thick, dark brown, blackish, irregularly ridged; leaves ovate to rounded, 8 to 20 cm. long, acute to rounded at apex, entire or repand-dentate, scabrous above; flowers in large or small cymes, orange; calyx 1 to 1.5 cm. long; fruit ovoid, 2.5 to 4 cm. long, white; wood hard, close-grained, dark brown, its specific gravity about 0.71. "Siricote blanco," "siricote," "copté," "zac-copté," "anacahuite," "anachuita" (Yucatán); "San Bartolomé" (Porto Rico); "vomitel colorado" (Cuba, Porto Rico).

The tree is often planted for ornament. The fruit is edible and is said to have emollient properties and to be used in the treatment of fevers. The plant has been employed also as a remedy for intestinal and stomach complaints and for bronchial affections.

18. Cordia pringlei Robinson, Proc. Amer. Acad. 26: 169. 1891.

Cordia pringlei altatensis T. S. Brandeg. Zoe 5: 219. 1905.

Sinaloa to San Luis Potosí and Veracruz; type from Las Palmas, San Luis Potosí. Nicaragua and Costa Rica.

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[1] Repert. Sp. Nov. Fedde 12: 240. 1913.

Shrub, 3 to 4.5 meters high; leaves ovate-oblong to broadly ovate, 4 to 10 cm. long, obtuse, coarsely crenate; heads 2.5 to 3 cm. in diameter, long-pedunculate; corolla white, 1 cm. long or less. "Huazimilla" (San Luis Potosí, *Seler*).

Some of the specimens have been determined as *C. macrocephala* H. B. K.

19. Cordia stellata Greenm. Proc. Amer. Acad. **39**: 86. 1903.

Puebla and Oaxaca; type from Oaxaca.

Shrub; leaves ovate to rounded-ovate, 2 to 10 cm. long, obtuse, coarsely crenate, densely stellate-pubescent; heads long-pedunculate, about 2 cm. in diameter; corolla white, 1 cm. broad or less.

20. Cordia corymbosa (L.) Don, Hist. Dichl. Pl. **4**: 383. 1838.

Lantana corymbosa L. Sp. Pl. 628. 1753.

Cordia ulmifolia Juss. in Dum. Cours. Bot. Cult. **2**: 148. 1802.

Veracruz. West Indies; Central and South America.

Shrub, 2 to 5 meters high, sometimes subscandent; leaves ovate, lance-oblong, or elliptic, 3 to 11 cm. long, acute or acuminate, serrate or subentire, scabrous above, pubescent beneath; heads numerous, about 7 mm. thick; corolla white, 4 to 5 mm. long; fruit red. "Basora prieta," "palo de perico," "saraguaso" (Porto Rico); "varilla negra" (Costa Rica).

21. Cordia urticacea Standl., sp. nov.

Type from Real de Guadalupe, Michoacán or Guerrero, altitude 1,200 meters (*Langlassé* 355; U. S. Nat. Herb. no. 385888).

Shrub, 2 meters high, the branchlets densely hispid; leaves slender-petiolate, elliptic or broadly elliptic, 11 to 15 cm. long, 6 to 8 cm. wide, acute, abruptly decurrent at base, coarsely serrate, hispid-hirsute; peduncles 12 cm. long, hispid, the heads 1.5 cm. in diameter; calyx sparsely hispid, the lobes filiform, 2 to 4 mm. long; corolla white, 3 cm. long, the limb 3 cm. broad.

22. Cordia limicola T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 502. 1919.

Veracruz; type from Zacuapan.

Shrub; leaves ovate or elliptic, 5 to 8 cm. long, acute, decurrent at base, coarsely crenate-dentate; peduncles equaling or longer than the leaves, the heads about 1 cm. in diameter; calyx 8 mm. long.

23. Cordia globosa (Jacq.) H. B. K. Nov. Gen. & Sp. **3**: 76. 1819.

Varronia globosa Jacq. Enum. Pl. Carib. 14. 1760.

Cordia dasycephala H. B. K. Nov. Gen. & Sp. **3**: 76. 1819.

Sinaloa and Durango to Oaxaca, Veracruz, and Yucatán. West Indies; Central and South America.

Shrub, 2 to 4.5 meters high; leaves narrowly lanceolate to ovate, 2 to 8 cm. long, obtuse to acuminate, coarsely serrate, very scabrous; heads mostly short-pedunculate, 1 cm. in diameter or slightly larger; corolla white; fruit red. "Ateje" (Cuba); "copillo," "saraguaso prieto" (Porto Rico); "cuajatinta," "zompopo" (El Salvador).

24. Cordia perlonga Fernald, Proc. Amer. Acad. **33**: 90. 1897.

Type from Acapulco, Guerrero.

Shrub with dark brown bark; leaves narrowly lanceolate to ovate-lanceolate, 6 to 9 cm. long, acuminate, coarsely serrate, very scabrous; peduncles longer than the leaves, the heads globose or oblong, in fruit 2 to 3 cm. long; corolla white.

25. Cordia appendiculata Greenm. Field Mus. Bot. **2**: 338. 1912.

Oaxaca.

Shrub or small tree, 3 to 4.5 meters high; leaves ovate or oblong-ovate, 3 to 7 cm. long, acute, serrate, appressed-hispid above, setulose-pilose beneath; heads long-pedunculate, globose, 2 to 3 cm. in diameter; corolla white.

Doubtfully distinct from *C. perlonga*. The description of *C. oaxacana* DC.[1], the type of which came from Tololafa, is strongly suggestive of this species, and that may be the oldest name for it.

26. Cordia podocephala Torr. U. S. & Mex. Bound. Bot. 135. 1859.

Nuevo León and Tamaulipas. Western Texas; type from San Antonio.

Plants suffrutescent, 30 to 60 cm. high; leaves ovate-oblong to narrowly lanceolate, 2 to 5 cm. long, obtuse or acute, coarsely serrate, scabrous; peduncles longer than the leaves, the heads 6 to 8 mm. thick; corolla white.

27. Cordia ambigua Schlecht. & Cham. Linnaea **5**: 115. 1830.

Veracruz; type from Jalapa.

Slender shrub or tree, 3 to 6 meters high; leaves broadly ovate or elliptic, 3 to 8 cm. long, acute, coarsely serrate, scabrous above, hirtellous beneath; heads 7 to 10 mm. in diameter, slender-pedunculate.

28. Cordia cana Mart. & Gal. Bull. Acad. Brux. **11**[2]: 331. 1844.

Cordia insularis Greenm. Proc. Amer. Acad. **33**: 482. 1898.

Sinaloa to Oaxaca; type from Oaxaca. Central America.

Shrub, 1.5 to 4.5 meters high; leaves lanceolate to oblong, ovate, or elliptic, 1.5 to 7.5 cm. long, acuminate to obtuse, serrate or subentire, scabrous above, usually strigose beneath; heads mostly 5 mm. (in fruit often 1 cm. thick) in diameter, slender-pedunculate; corolla greenish white. "Cuajatinta" (Guatemala, El Salvador); "varilla negra," "escobillo negro" (El Salvador).

29. Cordia ferruginea Roem. & Schult. Syst. Veg. **4**: 468. 1819.

Cordia laxiflora H. B. K. Nov. Gen. & Sp. **3**: 72. 1819.

Cordia crenulata A. DC. in DC. Prodr. **9**: 492. 1845.

Tepic to Chiapas and Veracruz. Guatemala to Colombia.

Shrub, 2 to 4.5 meters high, sometimes subscandent; leaves 4 to 15 cm. long, acute or acuminate, usually rounded and abruptly decurrent at base, serrate or subentire, scabrous or glabrate above, ferruginous-pubescent beneath; flowers in short or elongate, dense or interrupted spikes; corolla greenish white, about 4 mm. long. "Bejuco negro" (Guatemala, Honduras); "bubo," "gonguipo" (Veracruz, *Villada*).

30. Cordia cylindrostachya (Ruiz & Pav.) Roem. & Schult. Syst. Veg. **4**: 459. 1819.

Varronia cylindrostachya Ruiz & Pav. Fl. Peruv. Chil. **2**: 23. 1799.

?*Cordia obliqua* H. B. K. Nov. Gen. & Sp. **3**: 74. 1819.

Cordia linearis A. DC. in DC. Prodr. **9**: 493. 1845.

Cordia brevispicata Mart. & Gal. Bull. Acad. Brux. **11**[2]: 331. 1844.

Cordia palmeri S. Wats. Proc. Amer. Acad. **24**: 62. 1889.

Cordia socorrensis T. S. Brandeg. Erythea **7**: 5. 1899.

Cordia imparilis Macbride, Contr. Gray Herb. n. ser. **49**: 16. 1917.

Baja California and Sonora to Chiapas, Morelos, and Yucatán. West Indies; Central and South America; type from Peru.

Aromatic shrub, 1 to 3 meters high; leaves 2 to 10 cm. long, mostly linear, lanceolate, or oblong, usually serrate, commonly scabrous above and pubescent

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[1] Prodr. **9**: 497. 1845.

beneath, sometimes merely granular; spikes on long or short peduncles, short or elongate, usually dense; corolla white, about 4 mm. long; fruit red. "Tacotillo," "vara prieta" (Sinaloa); "hierba del pasmo" (Sonora); "azota caballos" (Tabasco, *Rovirosa*); "chovarobo," "sangre de toro" (Oaxaca, Chiapas, *Seler*); "oreja de ratón" (*Conzatti*); "xcopché" (Yucatán, Maya); "basora prieta," "saraguaso" (Porto Rico); "cuajatinta" (El Salvador).

The specimens exhibit notable variation in pubescence and leaf form, but they do not afford constant characters for specific segregation. In El Salvador the plant is said to be used for coagulating rubber and indigo.

DOUBTFUL SPECIES.

CORDIA COLLOCOCCA L. Sp. Pl. ed. 2. 274. 1762. Reported from Oaxaca by Hemsley, but the report is probably based upon an incorrect identification.

CORDIA FOLIOSA Mart. & Gal. Bull. Acad. Brux. 11[2]: 330. 1844. Type from Zacuapan, Veracruz.

CORDIA HARTWISSIANA Regel, Ind. Sem. Hort. Petrop. 39. 1858. Type from southern Mexico.

CORDIA ROTATA Moc.; DC. Prodr. 9: 483. 1845. Based upon one of Sessé and Mociño's plates.[1]

CORDIA SERRATIFOLIA H. B. K. Nov. Gen. & Sp. 3: 76. 1819. Type from Campeche.

2. BOURRERIA P. Br.; Jacq. Enum. Pl. Carib. 2, 14. 1760.

Shrubs or trees; leaves alternate, petiolate, entire; flowers rather large, white, in terminal corymb-like cymes; calyx campanulate, 2 to 5-lobate, the lobes valvate; corolla salverform, the limb usually 5-lobate; styles 2-cleft, the stigmas flattened; fruit a drupe, containing 4 bony nutlets.

Calyx glabrous outside or nearly so.
- Filaments glabrous ..... **1. B. pulchra.**
- Filaments pubescent.
  - Corolla 2 cm. long or more; leaves obtuse or acute at base. **2. B. formosa.**
  - Corolla about 13 mm. long; leaves mostly subcordate at base. **3. B. purpusii.**

Calyx tomentose or sericeous outside.
- Leaves abruptly short-acuminate; corolla tube much exceeding the calyx. **4. B. rekoi.**
- Leaves obtuse or rounded at apex; corolla tube about equaling the calyx.
  - Leaves glabrous beneath.
    - Leaves glabrous on the upper surface ..... **5. B. revoluta.**
    - Leaves scaberulous on the upper surface ..... **6. B. obovata.**
  - Leaves strigose or tomentose beneath.
    - Leaves tomentose or velutinous beneath with loose spreading hairs.
      - Corolla lobes oblong, acutish ..... **7. B. sonorae.**
      - Corolla lobes rounded ..... **8. B. andrieuxii.**
    - Leaves strigose or appressed-pilose beneath.
      - Leaves 3 times as long as broad or longer, the lateral nerves nearly obsolete ..... **9. B. spathulata.**
      - Leaves mostly twice as long as broad or less, the lateral nerves conspicuous ..... **10. B. strigosa.**

[1] DC. Calq. Dess. Fl. Mex. *pl. 880.*

1. Bourreria pulchra Millsp. Field Mus. Bot. 2: 338. 1912.

Cordia pulchra Millsp. Bot. Jahrb. Engler 36: Beibl. 80: 24. 1905.

Yucatán.

Leaves oblanceolate-oblong to elliptic-oval, 5 to 8 cm. long, obtuse, cuneate to rounded at base, minutely tomentulose beneath; cymes large, many-flowered; calyx 6 mm. long; corolla about 18 mm. long.

2. Bourreria formosa (DC.) Hemsl. Biol. Centr. Amer. Bot. 2: 369. *pl. 59.* 1882.

Ehretia formosa DC. Prodr. 9: 510. 1845.

Ehretia formosa oaxacana DC. Prodr. 9: 510. 1845.

Oaxaca; type from Tehuantepec. Guatemala and El Salvador.

Tree, glabrous throughout or nearly so; leaves slender-petiolate, oval to elliptic-oblong, 7 to 11 cm. long, obtuse to acuminate; cymes large, many-flowered; calyx 6 to 8 mm. long. "Quisjoche" (Costa Rica, cultivated); "esquinsuche," "listón" (El Salvador).

In El Salvador the dried flowers are added to the fermented beverage known as "agua dulce," which is prepared from crude sugar.

3. Bourreria purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 191. 1915.

Type from San Gerónimo, Oaxaca.

Shrub; leaves broadly ovate or rounded-ovate, 8 to 12 cm. long, acute, thinly pilose beneath, at least when young; cymes large, many-flowered; calyx 4 mm. long.

4. Bourreria rekoi Standl., sp. nov.

Type from Cafetal Alianza, Oaxaca, altitude 700 meters (*Reko* 3766; U. S. Nat. Herb. no. 887814).

Young branches sparsely hirtellous; leaves slender-petiolate, obovate or obovate-oblong, 8 to 16 cm. long, 4 to 8 cm. wide, abruptly short-acuminate, cuneate at base, glabrate above, sparsely and minutely hirtellous beneath or glabrate; cymes rather few-flowered, pedunculate; calyx 10 to 11 mm. long, the 5 or 6 lobes shorter than the tube, acuminate, densely hirtellous outside, tomentose within; corolla granular outside, the tube about 17 mm. long, the lobes 1 cm. long; filaments pubescent below.

5. Bourreria revoluta H. B. K. Nov. Gen. & Sp. 3: 67. 1819.

Type from Regla, Hidalgo.

Leaves obovate, 3.5 to 5 cm. long, obtuse, acute at base, coriaceous, reticulate-veined; cymes pedunculate; calyx tubular-campanulate, 5-dentate, pubescent; fruit subglobose, red.

6. Bourreria obovata Eastw. Proc. Amer. Acad. 44: 606. 1909.

Oaxaca; type from Jayacatlán, altitude 1,300 meters.

Leaves obovate, rounded or retuse at apex, attenuate to base; calyx 5-dentate, the teeth acute; corolla lobes 5 mm. long.

7. Bourreria sonorae S. Wats. Proc. Amer. Acad. 24: 62. 1889.

Baja California and Sonora; type from Guaymas, Sonora.

Shrub or small tree, 3 to 6 meters high; leaves oblanceolate-oblong to rounded-obovate, 2 to 5 cm. long, rounded at apex, obtuse to attenuate at base, very scabrous above, with prominent reticulate venation; cymes few-flowered or reduced to a single flower; corolla about 1 cm. long; fruit black, 1 cm. or less in diameter.

The fruit is said to be edible and to have a flavor suggesting that of hawthorn (*Crataegus*) fruit.

8. **Bourreria andrieuxii** (DC.) Hemsl. Biol. Centr. Amer. Bot. 2: 369. 1882.
Ehretia andrieuxii DC. Prodr. 9: 510. 1845.
Type from Puebla.
Leaves ovate, 2.5 to 4 cm. long, 1.2 to 2 cm. wide, rounded at base, canescent-pubescent; cymes short, few-flowered; calyx 4 mm. long; corolla tube 4 mm. long, the lobes 8 mm. long.

9. **Bourreria spathulata** (Miers) Hemsl. Biol. Centr. Amer. Bot. 2: 370. 1882.
Crematomia spathulata Miers, Ann. Mag. Nat. Hist. IV. 3: 310. 1869.
Type from Mexico.
Leaves elongate spatulate-oblong, 2.5 to 4 cm. long, 6 to 14 mm. wide, obtuse, scabrid above, strigose beneath, the margins revolute; cymes shorter than the leaves, 4 to 6-flowered; calyx 6 mm. long; corolla tube 1 cm. long.

10. **Bourreria strigosa** T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 390. 1909.
Puebla; type from Barranca de Tlacualosto.
Shrub, 1.8 to 3 meters high; leaves nearly sessile, obovate or obovate-oblong, 1.5 to 2.5 cm. long, rounded at apex, cuneate at base; cymes short, 6 to 12-flowered; calyx 5 to 6 mm. long; corolla about 8 mm. long.

DOUBTFUL SPECIES.

BOURRERIA HUANITA (Llave & Lex.) Hemsl. Biol. Centr. Amer. Bot. 2: 370. 1882.
Morelosia huanita Llave & Lex. Nov. Veg. Descr. 1: 1. 1824.
Crematomia huanita Miers, Ann. Mag. Nat. Hist. IV. 3: 313. 1869.
Type from Morelia, Michoacán.
Tree; leaves ovate, 7.5 to 10 cm. long, long-petiolate, lustrous; cymes many-flowered; calyx ventricose-tubular, 5-lobate; corolla tube not exceeding the calyx, the lobes rounded; filaments tomentose at base.
The writer has seen no specimens of the genus from Michoacán. It is probable that the plant is the same as *B. formosa*, and if so the name *B. huanita* should replace that one. *Bourreria huanita* is mentioned in various Mexican publications and the following vernacular names are reported: "Huanita" (Michoacán); "izquixochitl," "esquisúchil"; "jazmín de Tehuantepec" (Oaxaca); "yaga guiexoba" (Oaxaca, Zapotec).

3. EHRETIA L. Syst. Nat. ed. 10. 936. 1759.

Shrubs or trees; leaves alternate, entire or serrate; flowers small, white, the cymes arranged in chiefly terminal panicles; calyx 5-parted; corolla tube short, the limb with 5 obtuse spreading lobes; style bifid; fruit a small drupe.

Leaves entire.
Leaves smooth on the upper surface ..... 1. E. tinifolia.
Leaves very scabrous on the upper surface ..... 2. E. elliptica.
Leaves serrate, at least near the apex.
Leaves glabrous and smooth beneath ..... 3. E. luxiana.
Leaves scabrous or pubescent beneath, at least along the costa.
Leaves mostly rounded or obtuse at apex; corolla puberulent or scaberulous. 2. E. elliptica.
Leaves acute or acuminate; corolla glabrous.
Corolla about 10 mm. long ..... 4. E. tehuacana.
Corolla 7 mm. long or less.
Inflorescence glandular-puberulent ..... 5. E. viscosa.
Inflorescence without glandular pubescence.
Leaves cordate at base ..... 6. E. cordifolia.
Leaves rounded to acute at base ..... 7. E. latifolia.

1. **Ehretia tinifolia** L. Syst. Nat. ed. 10. 936. 1759.

Tamaulipas, Veracruz, Oaxaca, and Yucatán. West Indies.

Shrub or tree, glabrous throughout or nearly so, sometimes 27 meters high, with dense crown, the bark rather smooth; leaves petiolate, oblong to ovate, 5 to 12 cm. long, rounded to acutish at apex, obtuse or rounded at base, lustrous; panicles longer than the leaves, dense or open; corolla white, about 4 mm. long; fruit 5 to 6 mm. in diameter, red or purple. "Nandimbo" (Oaxaca); "manzana" (Tamaulipas, Veracruz); "manzanita" (Tamaulipas); "roble," "beec," "bec," "saúco" (Yucatán); "capulín cimarrón" (Oaxaca); "roble prieto" (Cuba).

The fruit is edible. The tree is often planted for shade.

The description of *E. longifolia* Miers,[1] which was based partly upon specimens from Jamaica and partly upon a specimen collected between Tehuacán and Oaxaca, suggests this species, and Miers's name is probably to be reduced to synonymy.

2. **Ehretia elliptica** DC. Prodr. 9: 503. 1845.

Ehretia ciliata Miers, Ann. Mag. Nat. Hist. IV. 3: 111. 1869.

Ehretia exasperata Miers, Ann. Mag. Nat. Hist. IV. 3: 112. 1869.

Coahuila to Guanajuato, Veracruz, and Tamaulipas. Western Texas.

Shrub or tree, sometimes 15 meters high; bark thick, furrowed, separating into thin, gray or reddish scales; leaves oblong to rounded, 3 to 7 cm. long, usually rounded or obtuse at base and apex, thick, very scabrous or sometimes glabrate beneath; panicles small, dense or open; flowers sweet-scented; corolla 6 to 7 mm. long; fruit 5 to 8 mm. in diameter, yellow; wood hard, weak, brown, close-grained, it specific gravity about 0.64. "Manzanita," "manzanillo" (Tamaulipas); "anacua" (Nuevo León, Tamaulipas, Texas); "anagua" (Nuevo León); "anacahuite" (Guanajuato).

In Texas the tree is known as "sugarberry," "nockaway," and "knackaway," the last two names being corruptions of the Mexican "anacua," which is itself an abbreviation of "anacahuite." The tree is often planted because of its dense foliage and handsome flowers. The wood is used for wheel spokes, axles, tool handles, and yokes. The fruit is sweet and edible.

3. **Ehretia luxiana** Donn. Smith, Bot. Gaz. 18: 5. 1893.

Oaxaca. Guatemala and El Salvador; type from San Miguel Uspantán, Guatemala.

Small tree; leaves lance-oblong to oblong-oval, 7 to 12 cm. long, acute to long-acuminate, rounded to acute at base, serrate toward the apex, scaberulous or smooth above; panicles small, dense; corolla 5 to 6 mm. long; fruit about 8 mm. in diameter. "Manzanita" (El Salvador).

4. **Ehretia tehuacana** Greenm. Field Mus. Bot. 2: 339. 1912.

Puebla; type from Tehuacán.

Leaves ovate-oblong, 4 to 8.5 cm. long, obtuse or rounded at base, dentate toward the apex, scabrous above, hirtellous beneath; fruit 6 to 8 mm. long.

5. **Ehretia viscosa** Fernald, Trees & Shrubs 1: 25. *pl. 13.* 1902.

Known only from the type locality, Chapultepec Springs near Cuernavaca, Morelos, altitude 1,500 meters.

Large tree with dense spreading crown; leaves oblong-ovate to broadly ovate, 5.5 to 12 cm. long, acute, rounded or subcordate at base, scabrous above, densely velutinous-hirtellous beneath; panicles small and dense; fruit nearly 1 cm. long.

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[1] Ann. Mag. Nat. Hist. IV. 3: 110. 1869.

6. **Ehretia cordifolia** Robinson, Proc. Amer. Acad. **29**: 319. 1894.

Type from Zapotlán, Jalisco.

Large tree; leaves ovate, 5 to 7 cm. long, acute, coriaceous, very scabrous; panicles small; fruit 8 mm. long.

7. **Ehretia latifolia** DC. Prodr. **9**: 503. 1845.

Ehretia mexicana S. Wats. Proc. Amer. Acad. **26**: 144. 1891.

Jalisco to Puebla and Oaxaca.

Leaves lance-oblong to broadly ovate or elliptic, 4 to 9 cm. long, acuminate, scabrous or scaberulous; panicles usually as long as the leaves, dense or open; fruit about 6 mm. long.

4. COLDENIA L. Sp. Pl. 125. 1753.

Herbs or low shrubs; leaves alternate, entire, small; flowers small, axillary or in terminal heads; calyx 4 or 5-parted, the segments narrow; corolla subrotate; styles 2, filiform; fruit drupaceous, globose, containing 4 hard nutlets.

A few other species, which are wholly herbaceous, occur in Mexico.

Plants erect; flowers in terminal heads----------1. **C. greggii.**
Plants prostrate or nearly so; flowers axillary.
Leaves linear, rigid. Fruit deeply 4-lobate----------2. **C. hispidissima.**
Leaves mostly ovate or elliptic.
Leaves hispidulous, green, without tomentum----------3. **C. purpusii.**
Leaves tomentose, whitish or grayish, often also hispidulous.
Leaves canescent-tomentose, the pubescence all appressed.
4. C. canescens.
Leaves hispid with spreading hairs and also tomentose.
Nutlets about 1 mm. long; petioles nearly as long as the blades.
5. C. mexicana.
Nutlets 1.5 mm. long; petioles very short----------**6. C. tomentosa.**

1. **Coldenia greggii** (Torr.) A. Gray, Syn. Fl. **2**[1]: 182. 1878.

Ptilocalyx greggii Torr. U. S. Rep. Expl. Miss. Pacif. **2**: 110. *pl. 8.* 1855.

Chihuahua, Coahuila, Durango, and Zacatecas; type from Buena Vista, Coahuila. Western Texas and southern New Mexico.

Shrub, 60 cm. high or less, much branched; leaves ovate or oval, 5 to 8 mm. long, canescent-tomentose, short-petiolate; calyx lobes filiform, plumose with long hairs; corolla 5 mm. long; fruit 4-sulcate. "Cenizo," "hierba del cenizo" (Durango).

2. **Coldenia hispidissima** (Torr.) A. Gray, Proc. Amer. Acad. **5**: 340. 1862.

Eddya hispidissima Torr. U. S. Rep. Expl. Miss. Pacif. **2**: 170. *pl. 9.* 1855.

Chihuahua and Coahuila. Western Texas to Arizona and Utah; type collected near El Paso, Texas.

Plants suffrutescent, much branched; leaves mostly sessile, 4 to 8 mm. long, hispid and puberulent, revolute, the costa thick and conspicuous; calyx lobes linear.

3. **Coldenia purpusii** T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 186. 1911.

San Luis Potosí; type from Minas de San Rafael.

Plants suffrutescent, hispid; leaves ovate or elliptic, 5 to 8 mm. long, acute, petiolate; calyx lobes linear; corolla purplish.

4. **Coldenia canescens** DC. Prodr. **9**: 559. 1845.

Stegnocarpus canescens Torr. U. S. Rep. Expl. Miss. Pacif. **2**: 169. 1855.

Chihuahua to Zacatecas, Hidalgo, and Tamaulipas; type collected between Santander and Victoria, Tamaulipas. Western Texas to Arizona.

Plants frutescent, canescent-sericeous or tomentose; leaves petiolate, mostly ovate or elliptic, 5 to 12 mm. long; calyx lobes linear-lanceolate; corolla purplish, 6 to 7 mm. broad. "Hierba de la virgen" (Coahuila, San Luis Potosí).

The plant is employed locally as a remedy for dysentery.

5. **Coldenia mexicana** A. Gray, Proc. Amer. Acad. 18: 119. 1883.

Coahuila; type from Saltillo.

Plants prostrate, fruticose, setose-hispid and canescent-tomentose; leaves ovate to broadly elliptic; flowers sessile; calyx lobes narrowly linear; corolla pink, 6 mm. long.

6. **Coldenia tomentosa** A. Gray, Proc. Amer. Acad. 18: 120. 1883.

Coahuila and Nuevo León; type from the Sierra Madre south of Saltillo, Coahuila.

Plants fruticose, setose-hispid and canescent-hispid; leaves lance-ovate, revolute; corolla purple.

5. TOURNEFORTIA L. Sp. Pl. 140. 1753.

Shrubs or small trees, often scandent; leaves entire; flowers small, in scorpioid cymose spikes or racemes; calyx 5-parted; corolla salverform, usually white, the throat naked; stamens included; fruit drupaceous, small, containing 4 nutlets.

Corolla lobes linear to triangular, acute or acuminate.
- Leaves glabrous beneath or sparsely scabrous or scaberulous.
  - Calyx equaling the corolla tube—1. T. umbellata.
  - Calyx much shorter than the corolla tube.
    - Lobes of the corolla as long as the tube; fruit sericeous—4. T. potosina.
    - Lobes much shorter than the tube; fruit glabrous or glabrate.
      - Fruit globose-ovoid, entire—2. T. glabra.
      - Fruit globose, 4-lobate—3. T. peruviana.
- Leaves densely sericeous or pubescent beneath.
  - Corolla lobes almost filiform, equaling the tube—4. T. potosina.
  - Corolla lobes linear or broader, shorter than the tube.
    - Corolla tube 2.5 to 3 mm. long—5. T. volubilis.
    - Corolla tube 5 to 8 mm. long.
      - Tube about 5 mm. long—6. T. nelsoni.
      - Tube 8 mm. long—7. T. caeciliana.

Corolla lobes broad, obtuse.
- Leaves linear or oblong-linear, very obtuse—8. T. gnaphalodes.
- Leaves lanceolate to broadly ovate, usually acute or acuminate.
  - Calyx lobes equaling the corolla, obtuse—9. T. calycina.
  - Calyx lobes shorter than the corolla.
    - Cymes dense, composed of 2 to 4 short spikes; leaves densely pubescent beneath, at least when young, often sessile.
      - Leaves mostly obtuse, crispate, the pubescence soft to the touch. 10. T. mollis.
      - Leaves acute or acuminate, not crispate, the pubescence harsh. 11. T. hartwegiana.
    - Cymes usually lax, composed of numerous spikes, these often elongate; leaves often glabrate, petiolate.
      - Leaves usually densely sericeous or pubescent beneath; calyx commonly half as long as the corolla tube or shorter. 12. T. hirsutissima.

Leaves glabrate or thinly scabrous beneath, or hirtellous along the nerves; calyx often more than half as long as the corolla tube.
Calyx lobes more than half as long as the corolla tube.
13. T. densiflora.
Calyx lobes less than half as long as the corolla tube.
Calyx lobes obtuse or acute; leaves usually glabrous.
14. T. bicolor.
Calyx lobes acuminate; leaves hirtellous beneath upon the nerves.
15. T. petiolaris.

1. Tournefortia umbellata H. B. K. Nov. Gen. & Sp. 3: 79. *pl. 202.* 1819.

Yucatán and Campeche; type collected near Campeche.

Low shrub, nearly glabrous; leaves short-petiolate, lanceolate or lance-oblong, 6 to 10 cm. long, acuminate, attenuate at base, glabrous; spikes several, elongate; corolla 3 to 4 mm. long, glabrous or scaberulous.

2. Tournefortia glabra L. Sp. Pl. 141. 1753.

Tournefortia cymosa L. Sp. Pl. ed. 2. 202. 1762.

Tepic to Oaxaca and Veracruz. West Indies and Central America.

Large shrub or small tree; leaves petiolate, lanceolate to elliptic, 6 to 16 cm. long, acuminate at base and apex, glabrous or sparsely sericeous when young; spikes usually numerous, slender, elongate; corolla whitish, the tube about 4 mm. long; fruit white, 5 mm. or less in diameter. "Limoncillo" (Veracruz).

In Oaxaca the leaves are applied as poultices to the feet as a remedy for influenza. A decoction of the plant is said to be employed in Veracruz, externally, as a remedy for rheumatism.

3. Tournefortia peruviana Poir. in Lam. Encycl. Suppl. 4: 425. 1816.

San Luis Potosí and Veracruz. West Indies and South America.

Shrub, nearly glabrous; leaves ovate or ovate-oblong, 6 to 11 cm. long, acuminate, rounded or obtuse at base, smooth; spikes usually numerous, slender, lax; corolla tube 5 to 6 mm. long; fruit yellowish, 6 mm. or less in diameter.

Some of the Mexican specimens have been determined incorrectly as *T. laurifolia* Vent.

4. Tournefortia potosina Standl., sp. nov.

San Luis Potosí; type from Tamasopo Canyon, altitude 750 meters (*Pringle* 3518; U. S. Nat. Herb. no. 316801).

Shrub, 2 to 3 meters high, the young branches strigose; leaves petiolate, lanceolate to oblong-ovate, 4 to 13 cm. long, acute to long-acuminate, obtuse or rounded at base, strigose-scabrous or glabrate above, densely strigose-scabrous beneath when young; cymes usually much branched, the spikes slender and lax, the flowers pedicellate; calyx lobes strigose, subulate, about half as long as the corolla tube; corolla strigose, the tube 2 to 3 mm. long, the lobes filiform-subulate, fully as long; fruit ovoid-globose, densely sericeous, terete.

Purpus 5377 and 5378 from Minas de San Rafael represent the same species.

5. Tournefortia volubilis L. Sp. Pl. 140. 1753.

Tournefortia velutina H. B. K. Nov. Gen. & Sp. 3: 79. *pl. 201.* 1819.

Tournefortia floribunda H. B. K. Nov. Gen. & Sp. 3: 79. 1819.

Messerschmidia candida Mart. & Gal. Bull. Acad. Brux. 11^2: 334. 1844.

Tournefortia candida Walp. Repert. Bot. 6: 556. 1846–47.

Baja California and Sinaloa to Tamaulipas, Veracruz, Yucatán, and Oaxaca. Southern Florida; West Indies; Central and South America.

Shrub, suberect with pendent branches or scandent; leaves lanceolate to oblong-ovate, 4 to 10 cm. long, acuminate, rounded or obtuse at base, usually grayish-sericeous, densely so beneath; spikes few or numerous, lax, long and slender; corolla tube about 3 mm. long, the lobes short; fruit 5 mm. or less in diameter. "Xulkin" (Yucatán, Maya); "comida de culebra" (Nicaragua); "pringamoza" (Porto Rico).

6. Tournefortia nelsoni Donn. Smith, Bot. Gaz. **23**: 10. 1897.

Veracruz and Puebla. Guatemala; type collected between San Martín and Todos Santos.

Scandent shrub; leaves petiolate, elliptic or ovate, 10 to 30 cm. long, acuminate, rounded or obtuse and decurrent at base, densely brownish-pubescent beneath; cymes large, the spikes numerous, elongate.

7. Tournefortia caeciliana Loesener, Verh. Bot. Ver. Brandenb. **55**: 190. 1913.

Type collected near Ococingo, Chiapas.

Leaves petiolate, oblong, 18 to 27 cm. long, caudate-acuminate, cuneate at base, densely velutinous beneath; spikes numerous, elongate; fruit 7 to 8 mm. long.

8. Tournefortia gnaphalodes (L) R. Br. Prodr. Fl. Nov. Holl. 496. 1810.

Heliotropium gnaphalodes L. Syst. Nat. ed. 10. 1913. 1759.

Mallotonia gnaphalodes Britton, Ann. Mo. Bot. Gard. **2**: 47. 1915.

Yucatán, on seashores. Florida; West Indies.

Shrub, 1 meter high or less, densely silvery-sericeous throughout; leaves 4 to 10 cm. long; cymes headlike, with 2 to 4 short branches; calyx lobes obtuse, nearly as long as the corolla; fruit ovoid, black, 5 mm. long. "Té del mar," "temporana" (Porto Rico).

9. Tournefortia calycina Benth. Bot. Voy. Sulph. 139. 1844.

Michoacán to Oaxaca; type from Acapulco.

Low shrub; leaves short-petiolate, lanceolate to broadly ovate, 6 to 12 cm. long, acuminate, attenuate or abruptly decurrent at base, scabrous; cymes composed of usually 4 dense spikes; corolla white, the tube 6 to 7 mm. long.

10. Tournefortia mollis (Torr.) A. Gray, Proc. Amer. Acad. **10**: 50. 1875.

Heliophytum molle Torr. U. S. & Mex. Bound. Bot. 138. 1859.

Tournefortia monclovana A. Gray, Proc. Amer. Acad. **18**: 120. 1883.

Chihuahua and Coahuila. Western Texas, the type collected opposite Presidio del Norte.

Plants about 30 cm. high or less, erect, chiefly herbaceous, soft-pubescent throughout; leaves lance-oblong to deltoid-ovate, 3 to 10 cm. long, rounded or truncate at base and often short-decurrent; corolla tube 4 mm. long.

11. Tournefortia hartwegiana Steud. Nom. Bot. ed. 2. **2**: 693. 1841.

Tournefortia capitata Mart. & Gal. Bull. Acad. Brux. 11^2: 332. 1844.

Baja California and Sonora to Tamaulipas, San Luis Potosí, and Oaxaca; type from Bolaños, Jalisco.

Erect shrub, 1 to 4 meters high; leaves lanceolate, oblanceolate, or elliptic-oblong, 5 to 13 cm. long, acuminate, attenuate at base, scabrous above, scaberulous or pubescent beneath; flowers sweet-scented; corolla white, the tube about 6 mm. long; fruit white. "Hierba del zapo," "hierba del burro," "confite coyote" (Sinaloa).

12. Tournefortia hirsutissima L. Sp. Pl. 140. 1753.

?*Tournefortia asperrima* Mart. & Gal. Bull. Acad. Brux. 11^2: 333. 1844.

Messerschmidia chrysantha Mart. & Gal. Bull. Acad. Brux. 11^2: 334. 1844.

Tournefortia chrysantha Walp. Repert. Bot. **6**: 556. 1846–47.

Sinaloa to Tamaulipas, Veracruz, Puebla, and Guerrero. West Indies; Central and South America.

Scandent shrub, the stems usually hirsute or hispid; leaves lance-oblong to elliptic or ovate-oval, 8 to 15 cm. long, acuminate, rounded to acute at base, scabrous above; cymes usually large and broad; corolla white, the tube 4 to 5 mm. long. "Amapa hasta," "perlas" (Sinaloa); "tlachichinoa" (Puebla, Morelos, Oaxaca); "tlepatli" (Jalisco, *Urbina*); "ortiguilla" (*Herrera*); "nigua" (Cuba, Porto Rico); "mata de nigua," "nigua peluda," "bejuco de nigua" (Porto Rico); "lágrimas de San Pedro" (Colombia); "tiricia," "frutilla" (Nicaragua).

The hairs of the stems penetrate the skin readily and cause irritation. The crushed leaves have been applied in the West Indies to the skin for the purpose of removing chiggers ("niguas"), and are said to be effective. The decoction of the plant is sometimes used as a wash to cure cutaneous diseases and ulcers of the mouth. The roots are reported to have diuretic properties.

13. Tournefortia densiflora Mart. & Gal. Bull. Acad. Brux. 11^2: 333. 1844.

Tournefortia trichocalycina DC. Prodr. 9: 517. 1845.

Sinaloa to Tamaulipas, Veracruz, and Oaxaca; type from Tampico, Tamaulipas. Guatemala.

Shrub, 1 to 4.5 meters high; leaves petiolate, lanceolate to ovate, 5 to 16 cm. long, acuminate, usually attenuate at base, scabrous; spikes few or numerous; corolla white, the tube about 7 mm. long; calyx lobes linear-attenuate. "Hierba del negro" (Oaxaca, *Reko*); "hierba rasposa" (Morelos); "topoya" (Oaxaca).

A decoction of the plant is said to be administered as a remedy for intestinal affections. In Oaxaca the plant is employed as a remedy for wounds and pimples.

14. Tournefortia bicolor Swartz, Prodr. Veg. Ind. Occ. 40. 1788.

Stenostomum dichotomum DC. Prodr. 4: 461. 1830.

Michoacán to Oaxaca, Tabasco, and Veracruz. West Indies; Central and South America.

Shrub, 3 to 5 meters high, erect or subscandent, glabrous or nearly so; leaves oblong to broadly elliptic, 6 to 16 cm. long, obtuse to acuminate, acute to rounded at base, lustrous; cymes usually large and composed of numerous spikes; corolla white, the tube 4 to 5 cm. long; fruit white. "Bejuco de nigua" (Porto Rico).

15. Tournefortia petiolaris DC. Prodr. 9: 520. 1845.

Morelos; type from somewhere in Mexico.

Shrub, 1 to 2 meters high; leaves ovate or elliptic, 9 to 21 cm. long, acuminate at base and apex, thin, scaberulous above; spikes elongate, lax; corolla white, the tube about 7 mm. long.

DOUBTFUL SPECIES.

TOURNEFORTIA ELLIPTICA Mart. & Gal. Bull. Acad. Brux. 11^2: 332. 1844. Type from the city of Veracruz.

TOURNEFORTIA HERNANDESII Dunal; DC. Prodr. 9: 529. 1845. Type from somewhere in Mexico.

TOURNEFORTIA SCHIEDEANA Don, Hist. Dichl. Pl. 4: 368. 1839. Type from Jalapa, Veracruz.

6. HELIOTROPIUM L. Sp. Pl. 130. 1753.

Shrubs or herbs; leaves alternate or opposite, entire; flowers small, in secund spikes or in bifid cymes, sometimes axillary; calyx 5-parted or 5-lobate, the lobes usually narrow; corolla salverform, the lobes broad or narrow; style short or elongate, the stigma conic or elongate; fruit dry, 2 or 4-lobate, separating into 2 or 4 nutlets.

Numerous herbaceous species occur in Mexico.

Flowers subtended by bracts or leaves, never in forked spikes.
- Fowers few, crowded at the ends of the branches____1. H. confertifolium.
- Flowers numerous, mostly in secund spikes.
  - Leaves narrowly linear, 1.5 mm. wide or less_____2. H. angustifolium.
  - Leaves linear or broader, 2.5 to 10 mm. wide.
    - Fruit glabrous_____3. H. rugosum.
    - Fruit strigose.
      - Pubescence of the stems chiefly of reflexed hairs___4. H. mexicanum.
      - Pubescence of the stems of erect hairs_____5. H. fruticosum.

Flowers in ebracteate spikes, these usually forked and forming cymes.
- Fruit at maturity separating into 2 2-celled nutlets_____6. H. parviflorum.
- Fruit separating into 4 1-celled nutlets.
  - Stems hirsute with spreading hairs, the pubescence fulvous. 7. H. jaliscense.
  - Stems strigose or pilose with ascending hairs, the pubescence white or gray.
    - Hairs on the lower surface of the leaves loose, not closely appressed. 8. H. coriaceum.
    - Hairs on the lower surface of the leaves very closely appressed.
      - Leaves linear, strongly revolute_____9. H. pueblense.
      - Leaves lanceolate or linear-lanceolate, not revolute__10. H. calcicola.

1. Heliotropium confertifolium Torr.; A. Gray, Syn. Fl. 2^1: 184. 1874.

Heliotropium limbatum confertifolium Torr. U. S. & Mex. Bound. Bot. 138. 1859.

Coahuila, Nuevo León, and San Luis Potosí. Western Texas; type from Leon Springs.

Plants suffrutescent, 30 cm. high or less, much branched, densely whitish-sericeous; leaves linear or narrowly oblong, 4 to 8 mm. long, crowded and imbricate; corolla pale purple, the tube about equaling the calyx.

2. Heliotropium angustifolium Torr. U. S. & Mex. Bound. Bot. 137. 1859.

Coahuila to Tamaulipas and San Luis Potosí. Western Texas.

Plants fruticose or suffrutescent, slender, 30 cm. high or less, canescent-strigose; leaves 8 to 20 mm. long, spreading, sessile; corolla scarcely exceeding the calyx, the lobes acute.

3. Heliotropium rugosum Mart. & Gal. Bull. Acad. Brux. 11^2: 336. 1844.

Type from plains of Ejutla, Oaxaca.

Plants fruticose, pilose; leaves lanceolate, petiolate, 3.5 cm. long attenuate at each end, rugose above; corolla scarcely exceeding the calyx.

4. Heliotropium mexicanum Greenm. Proc. Amer. Acad. 33: 484. 1898.

Chihuahua and Durango to Oaxaca and San Luis Potosí; type from Guanajuato.

Plants suffrutescent, 60 cm. high or less; leaves oblong-linear to linear-lanceolate, 1 to 5 cm. long, subsessile, strigose and hirtellous; corolla white, 5 to 6 mm. long.

5. **Heliotropium fruticosum** L. Syst. Nat. ed. 10. 913. 1759.

Sonora to Veracruz, Yucatán, and Oaxaca. West Indies; Central and South America.

Plants fruticose or suffrutescent, usually 60 cm. high or less, canescent-strigose; leaves linear to narrowly lanceolate, 1.5 to 5 cm. long; corolla white, about 5 mm. long. "Hierba de la mula" (Sinaloa); "hierba del loro" (El Salvador).

A decoction of the plant is employed in Sinaloa as a remedy for fevers.

6. **Heliotropium parviflorum** L. Mant. Pl. 2: 201. 1771.

Baja California and Sinaloa to Coahuila, Tamaulipas, Veracruz, Yucatán, and Puebla. Florida; West Indies; Central and South America.

Plants chiefly herbaceous but often suffrutescent below, 1 meter high or less, green, sparsely hirsute or hirtellous; leaves lanceolate to ovate, 3 to 10 cm. long, obtuse or acute, petiolate; spikes usually much elongate; corolla white, 2 mm. long or less. "Rabo de mico," "nemax" (Yucatán); "borraja" (El Salvador); "flor de alacrán" (Guatemala).

In Yucatán the plant is used as a remedy for nosebleed, diseases of the gums, and dysentery.

7. **Heliotropium jaliscense** Macbride, Proc. Amer. Acad. 51: 542. 1916.

Jalisco to Oaxaca; type from San Sebastián, Jalisco.

Plants fruticose or suffrutescent, green; leaves petiolate, lanceolate or lance-oblong, 5 to 10 cm. long, hispidulous; corolla 3.5 to 4 mm. long; fruit glabrous.

8. **Heliotropium coriaceum** Lehm. Act. Nov. Nat. Cur. 14^2: 810. 1829.

Chiapas.

Plants erect, fruticose; leaves short-petiolate or sessile, lance-oblong, 1.5 to 4.5 cm. long, acute, hispidulous above; corolla white, about 5 mm. long.

9. **Heliotropium pueblense** Standl., sp. nov.

Puebla; type from Tehuacán (*Rose, Painter & Rose* 9979; U. S. Nat. Herb. no. 453474).

Erect shrub; leaves linear or oblong-linear, subsessile, 6 to 20 mm. long, acute or obtuse, densely cinereous-strigose, the margins strongly revolute; peduncles 12 mm. long or less, bifid, the spikes few-flowered, less than 1 cm. long, the flowers sessile; calyx lobes lance-oblong, 1.5 mm. long, acute; corolla 2 to 2.5 mm. long, densely strigose outside.

Purpus 6502 from Tehuacán belongs to this species.

10. **Heliotropium calcicola** Fernald, Proc. Amer. Acad. 43: 62. 1907.

Heliotropium petraeum T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 384. 1913.

Guerrero to Tamaulipas and Veracruz; type from Iguala Canyon, Guerrero, altitude 750 meters.

Shrub, 0.5 to 1.2 meters high; leaves subsessile, 2 to 6 cm. long, obtuse or acute, silvery-sericeous or strigose, more densely so beneath; branches of the cyme short or elongate; corolla white, 2 to 2.5 mm. long.

DOUBTFUL GENERA.

Rhabdia lycioides Mart. (=*Rotula aquatica* Lour.) is reported from Oaxaca by Hemsley. No North American specimens have been seen by the writer.

146. VERBENACEAE. Vervain Family.

Shrubs or trees, sometimes herbs; leaves usually opposite or verticillate. simple or digitately compound, estipulate; flowers perfect, usually irregular; calyx inferior, persistent, campanulate or tubular, 4 or 5-lobate or dentate;

corolla gamopetalous, the tube cylindric or ampliate above, often curved, the limb 4 or 5-lobate, often bilabiate; perfect stamens 4 or 2, attached to the corolla and alternate with the lobes; style simple, entire or shortly bilobate; fruit drupaceous or subcapsular, 2 or 4-celled.

Several genera are represented in Mexico only by herbaceous species.

Leaves digitately compound----------1. **VITEX.**
Leaves simple.
  Flowers in heads, spikes, or racemes, rarely solitary in the leaf axils.
    Fruit with 4 stout spines at apex----------2. **GHINIA.**
    Fruit without spines.
      Flowers racemose.
        Calyx deeply lobate, strongly accrescent, blue; fruit dry--3. **PETREA.**
        Calyx shallowly dentate, not blue; fruit fleshy.
          Stigma bilobate; drupe containing 2 2-seeded nutlets.
                                                4. **CITHAREXYLUM.**
          Stigma 4-lobate; drupe containing 4 2-seeded nutlets.
                                                5. **DURANTA.**
      Flowers spicate or capitate.
        Stamens 2; spikes terminal----------6. **VALERIANOIDES.**
        Stamens 4; spikes or heads axillary and terminal.
          Fruit dry----------7. **LIPPIA.**
          Fruit fleshy----------8. **LANTANA.**
  Flowers in cymes or panicles.
    Fruit capsular; cymes very dense, headlike----------9. **AVICENNIA.**
    Fruit drupaceous; cymes loose and open.
      Nutlets of the fruit united.
        Nutlets united to form a single stone----------10. **CORNUTIA.**
        Nutlets cohering in pairs----------11. **CLERODENDRUM.**
      Nutlets distinct.
        Nutlet 1----------12. **PETITIA.**
        Nutlets 4.
          Branches of the style short, obtuse----------13. **CALLICARPA.**
          Branches of the style subulate----------14. **AEGIPHILA.**

1. **VITEX** L. Sp. Pl. 638. 1753.

Shrubs or trees; leaves opposite, digitately compound, the leaflets entire; cymes axillary or in terminal panicles; calyx campanulate, 5-dentate; corolla tube short, the limb oblique, somewhat bilabiate, 5-lobate; stamens 4; fruit drupaceous.

Leaflets usually 3; corolla densely sericeous-pilose outside-------1. **V. mollis.**
Leaflets mostly 5; corolla sparsely puberulent or glabrate.
  Leaflets densely tomentulose beneath.
    Corolla about 12 mm. long, the throat villous----------2. **V. pyramidata.**
    Corolla about 8 mm. long, the throat not villous----------3. **V. gaumeri.**
  Leaflets glabrous beneath or nearly so----------4. **V. hemsleyi.**

1. Vitex mollis H. B. K. Nov. Gen. & Sp. 2: 245. 1817.

Vitex lasiophylla Benth. Bot. Voy. Sulph. 155. 1844.

Baja California to Chihuahua, Morelos, and Oaxaca; type from Chilpancingo, Guerrero.

Large or medium-sized tree, 18 meters high or less, the bark grayish or brown, shredded; leaves long-petiolate, the leaflets normally 3, rarely 5, oblong to oval-oblong, 12 cm. long or less, obtuse or rounded at apex, densely velu-

tinous-pilose beneath; cymes few-flowered, axillary, long-pedunculate, densely pilose; corolla 1 cm. long; fruit globose, 1 to 2 cm. in diameter, bluish black. "Torete," "negro coyote," "tescalama" (Sinaloa); "ahuilote" (Jalisco, Colima); "agüilote" (Jalisco); "atuto" (Michoacán); "coyotomate" (Guerrero, Colima); "uvalama" (Baja California, Durango, Sinaloa); "uvalano" (Jalisco); "obalamo" (Sinaloa); "ualama," "valama" (Durango); "aguamalario" (Tepic).

The fruit is edible and is often sold in the markets. A decoction of the fruit and leaves is employed as a remedy for diarrhoea.

2. Vitex pyramidata Robinson, Proc. Amer. Acad. 29: 321. 1894.

Sonora to Durango and Jalisco; type from Tequila, Jalisco.

Shrub or sometimes a large tree, usually 15 meters high or less; leaves long-petiolate, the leaflets elliptic to lance-oblong, 18 cm. long or less, rounded to acuminate at apex, obtuse or rounded at base, glabrate above, beneath densely and minutely grayish-tomentulose; flowers in panicled cymes, the panicles axillary, pyramidal, many-flowered, about as long as the leaves; fruit about 1 cm. in diameter. "Tescalama," "negrito coyote" (Sinaloa).

The fruit is edible.

3. Vitex gaumeri Greenm. Field Mus. Bot. 2: 260. 1907.

Yucatán; type from Izamal.

Tree, 10 to 15 meters high; leaflets 5 or 7, ovate to elliptic-oblong, 5 to 11 cm. long, usually short-acuminate, obtuse to subcordate at base, pale and tomentulose beneath; cymes in axillary panicles, many-flowered; flowers bright purple; fruit about 1.5 cm. in diameter. "Yaxnic" (Maya).

4. Vitex hemsleyi Briq. Bull. Herb. Boiss. 4: 347. 1896.

Oaxaca; type collected between Juquila and Tutapeque.

Leaflets 5, ovate-elliptic or elliptic-obovate, 8 to 12 cm. long, acuminate, obtuse or acute at base, glabrous, at least in age; cymes many-flowered; corolla 7 to 8 mm. long, villous in the throat.

2. GHINIA Schreb. Gen. Pl. 19. 1789.

Small shrubs or sometimes herbs; leaves opposite, petiolate, coarsely toothed; flowers in long, terminal and axillary racemes; calyx tubular, 5-costate; corolla with slender tube, the limb spreading, 5-lobate; stamens 4; fruit dry, hard, with 4 short stout spines at apex.

Corolla 6 to 7 mm. long; leaves scaberulous on the upper surface.
1. G. curassavica.

Corolla about 15 mm. long; leaves glabrous on the upper surface.
2. G. euphrasiifolia.

1. Ghinia curassavica (L.) Millsp. Field Mus. Bot. 2: 174. 1906.

Verbena curassavica L. Sp. Pl. 19. 1753.

Tamonea curassavica Pers. Syn. Pl. 2: 139. 1806.

Tamonea scabra Schlecht. & Cham. Linnaea 5: 99. 1830.

San Luis Potosí, Veracruz, and Yucatán. West Indies.

Low shrub, or sometimes herbaceous, 60 cm. high or less; leaves ovate or rhombic-ovate, 1 to 4 cm. long, obtuse or acute, coarsely crenate-serrate, sparsely scaberulous; calyx 4 mm. long.

2. Ghinia euphrasiifolia (Robinson) Standl.

Tamonea euphrasiifolia Robinson, Proc. Amer. Acad. 44: 613. 1909.

Type from Alta Mira, Tamaulipas.

Low much-branched shrub, the branchlets puberulent; leaves deltoid-ovate, 4 to 6 mm. long, puberulent beneath; calyx 6 mm. long.

3. PETREA L. Sp. Pl. 626. 1753.

1. Petrea arborea H. B. K. Nov. Gen. & Sp. 2: 282. 1817.
Petrea mexicana Schiede, Linnaea 6: 373. 1831.
Petrea ovata Mart. & Gal. Bull. Acad. Brux. 11²: 329. 1844.
Guerrero to Tamaulipas, Veracruz, Yucatán, Tabasco, and Chiapas. Central and South America.

Large woody vine; leaves opposite, short-petiolate, elliptic-oblong to elliptic-oval or obovate-oblong, 4.5 to 14 cm. long, obtuse or acute, often subcordate at base, entire, coriaceous, scaberulous; flowers blue, in long pendent racemes; calyx tube very short, the lobes oblong or linear-oblong, in fruit 1.5 to 2 cm. long, blue, obtuse or acute; corolla funnelform, about 1 cm. long; fruit a small coriaceous indehiscent capsule. "Opp tzimin" (Yucatán, Maya); "toto-postillo," "soltero" (Oaxaca); "bejuco de caballo" (Yucatán, Veracruz); "raspa-sombrero," "jazmín," "coamecate azul" (Veracruz); "choreque" (Costa Rica); "buirá" (Panama); "hoja chigüe" (Nicaragua); "flor de Santa María" (Tabasco); "jazmín azul," "chaparrito" (Colombia); "adelfa," "flor de Jesús," "lengua de vaca," "Adolfina" (El Salvador).

The vine is an extremely showy one when in flower, and it (or *P. volubilis* L.) is sometimes cultivated as an ornamental plant under the name of "purple wreath." The tough stems are employed as a substitute for rope.

Petrea volubilis L. has been reported from Mexico but probably incorrectly.

4. CITHAREXYLUM L. Sp. Pl. 625. 1753.

Shrubs or trees; leaves opposite or ternate, entire or toothed; flowers small, in axillary or terminal racemes, rarely solitary in the leaf axils; calyx tubular-campanulate, truncate or 4 or 5-dentate, persistent in fruit; corolla tube cylindric, the limb 5-lobate, the lobes subequal; stamens 4; fruit drupaceous.

The fruits of some species are edible. The plants are used in domestic medicine, emmenagogue and pectoral properties being ascribed to them. Some species furnish hard strong wood, which is useful for various purposes. The following vernacular names are reported for plants of the genus whose specific identity is uncertain: "Chachalaca" (Michoacán); "naranjillo," "tepesi," "roble," "roble amarillo" (Veracruz); "comida de cuervo" (Durango).

Flowers solitary in the leaf axils or in 2 to 4-flowered racemes.
Leaves less than 1 cm. long——1. C. brachyanthum.
Leaves 2 to 6 cm. long or more, glabrous or pubescent.
Leaves glabrous beneath or very minutely and obscurely puberulent.
2. C. tetramerum.
Leaves hirtellous or tomentose beneath.
Calyx in fruit 4 to 4.5 mm. long; leaves mostly rounded at base.
3. C. altamiranum.
Calyx in fruit 2 to 2.5 mm. long; leaves decurrent at base——4. C. rosei.
Flowers in elongate many-flowered racemes.
Leaves copiously hirtellous or pilose beneath with spreading hairs.
Leaves flabelliform, 13 mm. long or less, crenate-lobate.
5. C. flabellifolium.
Leaves never flabelliform, much larger, entire or serrate.
Leaves stellate-tomentose beneath——6. C. rugendasii.
Leaves pubescent with simple hairs.
Flowers 9 to 15 mm. long.
Leaves densely hirtellous beneath; calyx 6 to 7 mm. long.
7. C. kerberi.
Leaves glabrous beneath except in the axils of the lateral nerves; calyx 4 mm. long——8. C. trinerve.

Flowers 8 mm. long or less.
Calyx lobes spreading, elongate, acuminate----------9. C. incanum.
Calyx lobes erect, short, obtuse, or the calyx truncate.
Leaves coriaceous when mature, prominently reticulate-veined; racemes chiefly straight, not nodding------10. C. berlandieri.
Leaves thin, not prominently reticulate; racemes usually curved and nodding.
Calyx 5 mm. long; corolla tube not or scarcely exceeding the calyx ----------11. C. bourgeauianum.
Calyx 3 mm. long; corolla tube conspicuously exceeding the calyx----------12. C. ovatifolium.
Leaves glabrous beneath or very minutely and obscurely puberulent.
Corolla lobes finely puberulent outside.
Leaves very obtuse, rounded, or emarginate at apex, coriaceous, with very prominent reticulate venation----------13. C. ellipticum.
Leaves mostly acute or acuminate, thin or coriaceous, the venation not very prominent and reticulate.
Calyx 1.5 to 2 mm. long----------14. C. glabrum.
Calyx 3.5 to 4.5 mm. long.
Leaves very lustrous on the upper surface; branches subterete. 15. C. lucidum.
Leaves dull; branches sharply 4 or 6-angulate--16. C. hexangulare.
Corolla lobes glabrous outside, often ciliate.
Petioles 5 mm. long or less. Corolla lobes strongly ciliate. 17. C. pringlei.
Petioles mostly 1 to 4 cm. long.
Corolla 6 to 7 mm. long, the lobes eciliate or nearly so--18. C. affine.
Corolla 3.5 to 4 mm. long, the lobes strongly ciliate----19. C. schottii.

1. Citharexylum brachyanthum A. Gray, Syn. Fl. ed. 2. 2[1]: 458. 1886.

Lycium brachyanthum A. Gray; Hemsl. Biol. Centr. Amer. Bot. 2: 426. 1882.

Coahuila, Nuevo León, Zacatecas, and Hidalgo; type from Coahuila. Western Texas.

Shrub, 1 to 1.5 meters high, with stiff subspinose branchlets; leaves linear-spatulate to obovate, subsessile, entire, puberulent or pubescent; flowers solitary or fasciculate; calyx about 2.5 mm. long, 5-dentate; corolla white, 4 mm. long; fruit 6 mm. in diameter.

2. Citharexylum tetramerum T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 390. 1909.

San Luis Potosí and Puebla; type from Cerro de Matzize, near San Luis Tultitlanapa, Puebla.

Shrub, 2 to 4 meters high; leaves oblanceolate or oblong-oblanceolate, 2.5 to 6 cm. long, short-petiolate, obtuse or subacute, glabrous beneath or obscurely puberulent, glandular-punctate; flowers solitary or in 2 or 3-flowered racemes, 4-parted; calyx 2.5 mm. long; corolla white, 4 to 5 mm. long.

It is probable that the oldest name for this plant is *C. lycioides* D. Don.[1] That species was described from Mexico, no definite locality being given.

3. Citharexylum altamiranum Greenm. Field Mus. Bot. 2: 259. 1907.

Querétaro; type from Hacienda del Ciervo.

Leaves elliptic to suborbicular, 2 to 4 cm. long, obtuse or rounded at apex, usually entire, hirsute-pubescent; calyx 5-dentate; fruit 7 to 8 mm. long.

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[1] Edinburgh New Phil. Journ. 11: 237. 1831.

4. **Citharexylum rosei** Greenm. Field Mus. Bot. 2: 260. 1907.

Type from San Pablo, Querétaro.

Leaves ovate or rhombic-ovate, 1 to 3 cm. long, obtuse, cinereous-tomentose beneath, entire; fruit 7 to 8 mm. long.

5. **Citharexylum flabellifolium** S. Wats. Proc. Amer. Acad. 24: 67. 1889.

Baja California and Sonora; type from Guaymas, Sonora.

Shrub, the branches terete; leaves rounded or truncate at apex, petiolate, hirtellous; calyx 6 mm. long, inclosing the fruit, the teeth subulate; corolla dark violet, 12 mm. long, the tube not exserted; fruit black, 4 to 6 mm. in diameter.

6. **Citharexylum rugendasii** Cham. Linnaea 7: 120. 1832.

?Citharexylum rugendasii endlichii Loesener, Repert. Sp. Nov. Fedde 9: 367. 1911.

Veracruz; type from Jalapa.

Medium-sized tree, the branches tetragonous; leaves ovate-oblong, 10 to 20 cm. long, 5 to 9 cm. wide, short-acuminate, rounded at base and decurrent, glabrous above, lustrous; racemes paniculate, erect; calyx 3 mm. long, hirtellous; corolla white, the tube longer than the calyx.

Schauer[1] states that *C. mocini* Don,[2] which was described from Mexico, differs only in its nodding racemes.

7. **Citharexylum kerberi** Greenm. Field Mus. Bot. 2: 188. 1907.

Type from Mexico, probably from Veracruz.

Branches terete or subetragonous; leaves short-petiolate, elliptic, obovate, or oblong-oblanceolate, 5 to 15 cm. long, acute or short-acuminate, scaberulous above, densely hirtellous beneath; racemes terminal, 13 to 18 cm. long; calyx 6 to 7 mm. long, 5-dentate; corolla glabrous outside. "Aceitunillo."

8. **Citharexylum trinerve** Blake, Proc. Biol. Soc. Washington 34: 45. 1921.

Type from Xnocac, Yucatán.

Shrub 1.5 meters high; leaves oval or elliptic, 3 to 5.5 cm. long, obtuse or emarginate, short-cuneate at base, reticulate-veined, strongly 3-nerved; spikes 2.5 cm. long; corolla glabrous outside.

9. **Citharexylum incanum** Sessé & Moc.; Don, Edinburgh New Phil. Journ. 11: 238. 1831.

Citharexylum scabrum Sessé & Moc.; Don, Edinburgh New Phil. Journ. 11: 238. 1831.

Citharexylum cinaloanum Robinson, Bot. Gaz. 16: 342. 1891.

Sinaloa.

Leaves on long or short petioles, oval to oblong-ovate, 3 to 10 cm. long, rounded to acuminate at apex, rounded to acute at base and decurrent, entire or dentate, scabrous above, finely hirtellous beneath, with prominent reticulate venation; racemes terminal, solitary or paniculate, erect; calyx 2 mm. long; corolla puberulent outside.

The original descriptions of the two Sessé and Mociño species are incomplete, but both mention the recurved or spreading calyx teeth. The present plant is the only Mexican one seen by the writer which possesses this character.

10. **Citharexylum berlandieri** Robinson, Proc. Amer. Acad. 26: 174. 1891.

Sinaloa, Tamaulipas, San Luis Potosí, and Veracruz; type from Las Canoas, San Luis Potosí.

Shrub or tree, 2 to 9 meters high, the trunk sometimes 30 cm. in diameter, the branches pendent; tetragonous when young; leaves oblong to ovate or

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[1] In DC. Prodr. 11: 614. 1847.

[2] Edinburgh New Phil. Journ. 11: 238. 1831.

rhombic, 3 to 8 cm. long, rounded to acuminate at apex, usually entire, rarely coarsely dentate, scabrous or pubescent above, usually velutinous-pubescent beneath; racemes mostly axillary and short; calyx 4 mm. long; fruit about 6 mm. long, at first yellow, black when mature. "Negrito," "orcajuela," "revienta-cabra" (Tamaulipas); "saúco hediondo" (Veracruz); "cacachila," "panochillo" (Sinaloa).

A decoction of the plant is adminstered as a remedy for colds. This species has been reported from Mexico as *C. villosum* Jacq.

11. **Citharexylum bourgeauianum** Greenm. Field Mus. Bot. 2: 185. 1907.

Veracruz; type from Orizaba.

Tree, the branchlets tetragonous; leaves oval-elliptic to oblong-lanceolate, 6 to 18 cm. long, acuminate, acute at base, entire, glabrous above or nearly so, finely hirtellous beneath; racemes terminal, solitary or paniculate, 20 cm. long or less; corolla white or pink.

12. **Citharexylum ovatifolium** Greenm. Proc. Amer. Acad. 32: 301. 1897.

Morelos, Hidalgo, and Oaxaca; type from Cuernavaca, Morelos.

Shrub or small tree, 2 to 6 meters high, the branchlets quadrangular; leaves ovate or elliptic, 4 to 12 cm. long, acute or acuminate, entire or more or less crenate-serrate, scabrid above, hirtellous beneath; racemes terminal or axillary, 10 cm. long or less.

One specimen which the writer has referred here with some doubt was determined originally as *C. sessei* Don.[1] The description of that species agrees fairly well with the specimens referred here, but it is too incomplete to permit a definite decision upon the subject.

13. **Citharexylum ellipticum** Sessé & Moc.; Don, Edinburgh New Phil. Journ. 11: 238. 1831.

Veracruz; type from somewhere in Mexico.

Branchlets quadrangular; leaves short-petiolate, oblong to elliptic or broadly ovate, 3.5 to 9.5 cm. long, obtuse or acute at base; racemes elongate, erect; calyx 2 to 3 mm. long; fruit about 5 mm. in diameter.

14. **Citharexylum glabrum** (S. Wats.) Greenm. Proc. Amer. Acad. 32: 300. 1897.

Gonzalea glabra S. Wats. Proc. Amer. Acad. 25: 152. 1890.

Type from Lake Chapala, Jalisco.

Tree, 6 to 8 meters high, glabrous; leaves slender-petiolate, oblong or lance-oblong, 5 to 10 cm. long, narrowed to the obtuse or acute apex, obtuse or acute at base, entire; racemes 5 to 11 cm. long, nodding, dense; corolla 5 mm. long; flowers fragrant.

15. **Citharexylum lucidum** Schlecht. & Cham. Linnaea 5: 97. 1830.

Veracruz; type from Jalapa.

Glabrous throughout; leaves lanceolate to elliptic, 8 to 15 cm. long, acute at base, very lustrous above; racemes chiefly terminal, solitary or paniculate, erect; flowers white, fragrant.

By Schulz[2] *C. lucidum* is listed as a synonym of *C. caudatum* L., a West Indian species, but the Mexican plant appears to be specifically distinct.

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[1] Edinburgh New Phil. Journ. 11: 238. 1831.

[2] In Urban, Symb. Antill. 6: 58. 1909.

16. **Citharexylum hexangulare** Greenm. Field Mus. Bot. 2: 187. 1907.

Veracruz. Guatemala; type from Cubilquitz, Alta Verapaz.

Glabrous shrub; leaves often ternate, lanceolate or oblong-lanceolate, 6 to 15 cm. long, usually acuminate, acute at base; racemes mostly terminal and paniculate, 10 to 20 cm. long.

17. **Citharexylum pringlei** Greenm. Proc. Amer. Acad. 41: 243. 1905.

Type from Trinidad Iron Works, Hidalgo, altitude 1,500 meters.

Shrub, 3 to 4.5 meters high, glabrous; leaves elliptic to lance-oblong, 3.5 to 7 cm. long, acute or obtuse-acuminate, entire, very lustrous above; racemes terminal, simple, nodding, 10 cm. long or less; corolla 5 cm. long.

18. **Citharexylum affine** Don, Edinburgh New Phil. Journ. 11: 238. 1831.

Citharexylum jurgenseni Briq. Bull. Herb. Boiss. 4: 342. 1896.

Citharexylum emrickianum Greenm. Field Mus. Bot. 2: 187. 1907.

Sinaloa to Oaxaca, Puebla, and Mexico; type from Chalco, Mexico (State).

Shrub or tree, 2 to 6 meters high, glabrous, the branchlets quadrangular and sometimes narrowly winged; leaves oblong to broadly rhombic-ovate, 5 to 20 cm. long, rounded to long-acuminate at apex, acute or obtuse at base, entire; racemes axillary or terminal, nodding, slender, often very long; flowers bluish or violet; fruit 6 to 10 mm. long. "Coral" (Guerrero); "chacalpezle" (Oaxaca); "cacachila" (Sinaloa).

19. **Citharexylum schottii** Greenm. Field Mus. Bot. 2: 190. 1907.

Yucatán; type from Mérida.

Glabrous shrub or tree; leaves lanceolate, 4 to 10 cm. long, obtuse-acuminate, acute at base; racemes numerous, slender, 12 cm. long or less; calyx 2.5 mm. long; fruits 5 to 7 mm. long.

This has been reported from Yucatán as *C. quadrangulare* Jacq.

DOUBTFUL SPECIES.

CITHAREXYLUM PAUCIFLORUM T. S. Brandeg. Zoe 5: 236. 1906.

5. DURANTA L. Sp. Pl. 637. 1753.

1. **Duranta repens** L. Sp. Pl. 637. 1753.

Duranta erecta L. Sp. Pl. 637. 1753.

Duranta plumieri Jacq. Stirp. Amer. 186. 1763.

Duranta xalapensis H. B. K. Nov. Gen. & Sp. 2: 255. 1817.

?*Duranta macrocarpa* H. B. K. Nov. Gen. & Sp. 2: 255. 1817.

Baja California and Sinaloa to Chiapas, Puebla, Veracruz, and Yucatán. Widely distributed in tropical America.

Shrub or tree, 6 meters high or less, usually armed with spines, the branches slender, often drooping or trailing; leaves opposite or verticillate, short-petiolate, ovate-elliptic, oval, or obovate, 2 to 5 cm. long, obtuse, entire or serrate above the middle; finely pubescent or glabrate; flowers lilac or white, in long loose racemes; calyx tubular, 4 to 6 mm. long, minutely 5-dentate; corolla salverform, the limb 8 to 15 mm. broad; fruit globose, yellow, 7 to 11 mm. in diameter, inclosed in the accrescent calyx, this produced into a curved beak. "Espina blanca" (Veracruz); "xcambocoché" (Yucatán, Maya); "Adonis blanco," "Adonis morado," "garbancillo," "espino negro" (Colombia);

"celosa," "celosa cimarrona," "violetina" (Cuba); "espina de paloma" (Panama); "lluvia," "azota-caballo," "lila," "cuenta de oro" (Porto Rico); "pensamiento" (Nicaragua); "lora" (Panama); "heliotropio," "chulada" (El Salvador).

The fruit has been used as a febrifuge, and stimulant properties have been ascribed to the flowers.

6. VALERIANOIDES Medic. Phil. Bot. 1: 177. 1789.

Shrubs or herbs; leaves opposite or alternate, toothed; flowers spicate, sessile in the axils of bracts or imbedded in excavations in the thick rachis; calyx tubular, 5-lobate; corolla salverform or funnelform; stamens 2; fruit dry, included in the calyx, separating into 2 nutlets.

Spikes (excluding the corollas) 1 cm. or more in diameter, the flowers not closely appressed; style exserted.
- Spikes about 20 cm. long ---- 1. V. albiflorum.
- Spikes less than 12 cm. long.
  - Calyx very densely and minutely puberulent ---- 2. V. luisanum.
  - Calyx hirtellous or hirsute.
    - Bracts long-ciliate ---- 3. V. acuminatum.
    - Bracts not conspicuously ciliate ---- 4. V. nelsonii.

Spikes 7 mm. or less in diameter, the flowers closely appressed to the rachis; style usually not exserted.
- Calyx usually glabrous; corolla blue ---- 5. V. jamaicense.
- Calyx pubescent; corolla purplish or reddish ---- 6. V. mutabile.

1. Valerianoides albiflorum (DC.) Kuntze, Rev. Gen. Pl. 2: 510. 1891.
Stachytarpheta albiflora DC.; Schauer in DC. Prodr. 11: 567. 1847.
?*Stachytarpheta albiflora coerulea* Loesener, Repert. Sp. Nov. Fedde 9: 366. 1911.

Type from Oaxaca; reported from Hidalgo.

Shrub, the branches pubescent; leaves ovate or elliptic, large, contracted below and subsessile, acuminate, coarsely crenate, strigose above, canescent-tomentose beneath; calyx 10 to 14 mm. long; corolla white.

2. Valerianoides luisanum Standl., sp. nov.

Type from Barranca de Tlacuilosto, near San Luis Tultitlanapa, Puebla (*Purpus* 2568; U. S. Nat. Herb. no. 840562).

Shrub, the branchlets densely puberulent; leaves alternate, short-petiolate, oblong-ovate or rhombic-ovate, 1.5 to 3 cm. long, obtuse or acute, abruptly decurrent at base, coarsely crenate-serrate, minutely scaberulous; spikes 4 to 7 cm. long, the rachis puberulent; bracts lanceolate, acuminate, shorter than the calyx, minutely canescent-scaberulous; calyx 1 cm. long, scaberulous, deeply cleft ventrally, bidentate at apex; corolla tube slender, glabrous, about equaling the calyx, the limb 12 mm. broad; style exserted.

3. Valerianoides acuminatum (DC.) Kuntze, Rev. Gen. Pl. 2: 510. 1891.
Stachytarpheta acuminata DC.; Schauer in DC. Prodr. 11: 570. 1847.

Oaxaca.

Plants suffrutescent; leaves oblong-ovate or elliptic-oblong, 4 to 7 cm. long, acute or obtuse, crenate-serrate, scaberulous or beneath hirtellous; calyx 8 mm. long; corolla violaceous.

4. Valerianoides nelsonii (Robins. & Greenm.) Standl.

Stachytarpheta nelsonii Robins. & Greenm. Amer. Journ. Sci. 50: 162. 1895.

Type collected above Dominguillo, Oaxaca.

Shrub, the branchlets densely hirtellous; leaves ovate, 2.5 to 4 cm. long, acute, coarsely serrate-dentate, tomentose beneath; spikes 5 to 10 cm. long; calyx 8 mm. long; corolla purple.

Probably only a form of *V. acuminatum*.

5. Valerianoides jamaicense (L.) Medic. Phil. Bot. 1: 178. 1789.

Verbena jamaicensis L. Sp. Pl. 19. 1753.

Stachytarpheta jamaicensis Vahl, Enum. Pl. 1: 206. 1804.

Guerrero to Veracruz and Yucatán. Widely distributed in the tropics of both hemispheres.

Plants essentially annual but sometimes suffrutescent, glabrous or nearly so; leaves petiolate, oblong to ovate, 2 to 8 cm. long, coarsely serrate-dentate; spikes 15 to 50 cm. long; corolla 8 to 11 mm. long. "Verbena azul" (Nicaragua).

The plant is a common tropical weed. It is said to have emetic, cathartic, anthelmintic, and emmenagogue properties, and is used in various localities as a remedy for intestinal worms, venereal diseases, ulcers, erysipelas, yellow fever, dropsy, and stomach affections. It has been reported to be poisonous to sheep. In Brazil the leaves have been employed for adulterating tea, and the dried leaves are said to have been exported to Europe under the name "Brazilian tea."

6. Valerianoides mutabile (Jacq.) Kuntze, Rev. Gen. Pl. 2: 510. 1891.

Verbena mutabilis Jacq. Icon. Rar. *pl. 207*. 1786.

Stachytarpheta mutabilis Vahl, Enum. Pl. 1: 209. 1805.

Stachytarpheta purpurea Greenm. Field Mus. Bot. 2: 258. 1907.

Sinaloa to Guerrero, Veracruz, and Yucatán. Widely distributed in tropical regions.

Plants chiefly herbaceous but often suffrutescent; leaves broadly ovate to oblong-ovate or spatulate-ovate, 3 to 10 cm. long rounded to acuminate at apex, abruptly contracted below and decurrent, scaberulous, pubescent, or hirsute; spikes 10 to 30 cm. long or more, stout, pubescent; corolla 12 to 15 mm. long. "Verbena rosada" (Nicaragua); "rabo de zorro" (Colombia); "cola de alacrán," "verbena" (El Salvador).

Stachytarpheta purpurea is a hirsute form.

7. LIPPIA L. Sp. Pl. 633. 1753.

Shrubs or small trees, sometimes herbs; leaves opposite or ternate, entire, toothed, or lobed; flowers capitate or spicate, small, bracteate; calyx small, ovoid, campanulate, or compressed, 2 or 4-dentate; corolla tube cylindric, the limb oblique, somewhat bilabiate, 4 or 5-lobate; stamens 4; fruit dry, 2-celled, included in the calyx.

Several herbaceous species occur in Mexico. The name "tehuacán" is said to be applied to some species of the genus in Tabasco and Yucatán.

Flowers in slender, elongate, more or less interrupted spikes.

Leaves entire----1. L. ligustrina.

Leaves crenate.

Flowers 3 mm. long----2. L. wrightii.

Flowers 5 to 6 mm. long----3. L. macrostachya.

Flowers capitate or in short, very dense spikes.
Bracts 4-ranked; heads somewhat elongate, at least in fruit.
Heads short-pedunculate, the peduncles mostly shorter than the petioles----4. L. palmeri.
Heads long-pedunculate, the peduncles mostly longer than the petioles.
Leaves mostly 3.5 to 5 cm. long----5. L. graveolens.
Leaves mostly 1.5 to 3.5 cm. long----6. L. berlandieri.
Bracts irregularly imbricate in several ranks.
Bracts broad, accrescent in fruit, becoming membranaceous and prominently veined, the outer ones involucre-like.
Calyx hirsute with very long straight spreading hairs----7. L. barbata.
Calyx hirtellous with short hairs or puberulent or lanate.
Peduncles much shorter than the heads.
Heads in the axils of large leaves----8. L. chrysantha.
Heads in interrupted, nearly naked spikes or racemes, the floral leaves reduced and bractlike----9. L. oaxacana.
Peduncles longer than the heads, at least in anthesis.
Leaves 4.5 cm. long or less, usually obtuse.
Corolla limb about 8 mm. broad----10. L. formosa.
Corolla limb about 2 mm. broad----11. L. nutans.
Leaves mostly 6 to 15 cm. long, usually acute or acuminate.
Bracts purple----12. L. callicarpaefolia.
Bracts not colored----13. L. umbellata.
Bracts not or scarcely accrescent in fruit, not becoming membranaceous and prominently veined.
Heads commonly 4 or more at each node----14. L. myriocephala.
Heads usually 1 or 2 at each node.
Leaves pinnatifid----15. L. appendiculata.
Leaves crenate or serrate.
Leaves linear-oblong or oblong-lanceolate, 12 mm. wide or less.
Heads elongate in fruit; leaves 2.5 to 6 cm. long.
16. L. stoechadifolia.
Heads not elongate; leaves 1.5 cm. long or less--17. L. fastigiata.
Leaves oblong-ovate to broadly rhombic-ovate, usually more than 2 cm. wide.
Leaves thin, the pubescence all appressed; peduncles usually much longer than the petioles----18. L. dulcis.
Leaves thick, the pubescence of the lower surface chiefly of spreading hairs; peduncles slightly if at all exceeding the petioles.
19. L. geminata.

1. Lippia ligustrina (Lag.) Britton, Trans. N. Y. Acad. Sci. 9: 181. 1890.

Verbena ligustrina Lag. Gen. & Sp. Nov. 18. 1816.

Lippia lycioides Steud. Nom. Bot. ed. 2. 2: 254. 1841.

Aloysia floribunda Mart. & Gal. Bull. Acad. Brux. 11: 320. 1844.

Sonora to Nuevo León, Puebla, and Zacatecas. Western Texas and southern Arizona.

Slender shrub, 1 to 4.5 meters high; leaves subsessile, lance-oblong, 0.5 to 2.5 cm. long, acute or obtuse, scaberulous, usually all entire but on young shoots sometimes serrate; spikes racemose; flowers sweet-scented, white or tinged with violet, 4 to 5 mm. long. "Vara dulce" (Neuevo León); "agrito" (Zacatecas); "jaboncillo" (Chihuahua); "jazmincillo" (Durango, Coahuila); "jasminillo," "vara dulce," "hierba dulce" (Durango); "huele de noche"

(Coahuila); "jaboncillo[1]" (Chihuahua, *Palmer*); "cabradora" (Texas); "vara blanca."

Employed in Coahuila as a remedy for diseases of the bladder.

A closely related species is *L. triphylla* (L'Hér.) Kuntze (*L. citriodora* H. B. K.), the lemon verbena, a native of South America but often cultivated in Mexican gardens. It is easily recognized by its much larger ternate leaves. In Mexico it is said to be known as "cedrón," "hierba Luisa," and "hierba de la princesa." The name "cedrón" is used also in South America, and in Peru the plant is known as "cedroncillo." In Mexico the plant is employed in domestic medicine as an antispasmodic and emmenagogue, and in other regions it is employed for various purposes. In southern Europe perfume has been manufactured from the leaves.

2. **Lippia wrightii** A. Gray, Amer. Journ. Sci. II. 16: 98. 1853.

Sonora to Coahuila, Zacatecas, and Durango. Western Texas to Arizona.

Shrub, 1 to 2 meters high; leaves petiolate, ovate to rounded-ovate, 6 to 15 mm. long, rounded at apex, rugose above and scabrous, canescent-tomentose beneath; flowers white. "Vara dulce," "altamisa" (Coahuila).

3. **Lippia macrostachya** S. Wats. Proc. Amer. Acad. 18: 134. 1883.

Coahuila to Tamaulipas and San Luis Potosí; type from mountains east of Saltillo, Coahuila.

Shrub, 1 to 2 meters high; leaves rounded-ovate to oblong-ovate, 1 to 4.5 cm. long, obtuse or rounded at apex, truncate or subcordate at base, canescent-tomentose beneath; spikes 18 cm. long or less; flowers pink.

4. **Lippia palmeri** S. Wats. Proc. Amer, Acad. 24: 67. 1889.

Baja California, Sonora, and Sinaloa; type from Guaymas, Sonora.

Shrub, 0.5 to 2 meters high, the pubescence of the branchlets appressed; leaves petiolate, ovate to rounded-ovate, 1 to 2.5 cm. long, obtuse or rounded at apex, usually decurrent at base, coarsely crenate, scaberulous; heads 13 mm. long or less; flowers white, turning to yellow or pink. "Orégano" (Sonora).

The leaves are used for flavoring meat. *L. palmeri spicata* Rose[2] described from La Paz, Baja California, is a form with spikes sometimes 2.5 cm. long.

5. **Lippia graveolens** H. B. K. Nov. Gen. & Sp. 2: 266. 1817.

Yucatán and Campeche; type from Campeche.

Shrub or small tree, sometimes 9 meters high; leaves petiolate, ovate-oblong or lance-oblong, obtuse or acute, rounded or subcordate at base, crenate, puberulent and glandular beneath; heads 4 to 6 at each node. "Orégano" (Yucatán).

6. **Lippia berlandieri** Schauer in DC. Prodr. 11: 575. 1847.

Coahuila to Tamaulipas, Veracruz, Oaxaca, and Sinaloa; type collected between Santander and Victoria, Tamaulipas.

Shrub, 1 to 2.5 meters high, the pubescence of the branchlets usually spreading; leaves petiolate, oblong to ovate or oval, obtuse or usually rounded at apex, rounded at base, crenate, densely pubescent beneath; heads 4 to 12 mm. long; flowers white. "Orégano" (Durango, Puebla, Guerrero, Coahuila); "salvia" (Puebla); "epazote," "epazotl" (Coahuila); "hierba dulce" (Hidalgo, Veracruz).

It is rather doubtful whether this differs in any important character from *L. graveolens*, but the Yucatán material available is insufficient to afford a

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[1] Probably an error for "jazmincillo."

[2] Contr. U. S. Nat. Herb. 1: 75. 1890.

basis for definite conclusions. The leaves of *L. berlandieri* are employed for seasoning food. The plant is used in domestic medicine as a stimulant, emmenagogue, and demulcent.

7. **Lippia barbata** T. S. Brandeg. Proc. Calif. Acad. II. 2: 196. 1889.
Lippia montana T. S. Brandeg. Proc. Calif. Acad. II. 3: 163. 1891.
Baja California; type from La Giganta, near Comondú.
Shrub, 1 to 3.5 meters high; leaves petiolate, ovate or oblong-ovate, 2 to 5 cm. long, rounded to acute at apex and base, crenate, thick, rugose, very scabrous; heads rather lax, in fruit 2 to 3 cm. long, the bracts oblong; corolla 5 mm. long, yellow turning red.

8. **Lippia chysantha** Greenm. Proc. Amer. Acad. 39: 87. 1903.
Morelos and Chiapas; type from Yautepec, Morelos, altitude 1,350 meters.
Shrub, 1.5 to 2.5 meters high; leaves short-petiolate, lanceolate or lance-oblong, 4.5 to 8 cm. long, acute or obtuse, rounded or acute at base, finely crenate, hispidulous above, tomentose beneath; heads sessile or nearly so; bracts lanceolate or oblanceolate; corolla 5 to 6 mm. long, yellow.

9. **Lippia oaxacana** Robins. & Greenm. Amer. Journ. Sci. 50: 162. 1895.
Puebla, Guerrero, and Oaxaca; type from Las Joyas Canyon, Oaxaca, altitude 1,500 meters.
Shrub, 1 to 2.5 meters high; leaves short-petiolate, oblong-ovate to ovate-elliptic, 2 to 4.5 cm. long, acute to rounded at apex, obtuse or rounded at base, finely crenate, very rugose above, tomentose beneath; heads in terminal naked spikes; bracts rhombic-obovate, yellowish green; corolla 3 mm. long. "Canelilla" (Oaxaca).

10. **Lippia formosa** T. S. Brandeg. Proc. Calif. Acad. II. 3: 163. 1891.
Baja California; type from Bahía de Todos Santos.
Shrub, 2 to 4 meters high; leaves spatulate-ovate, obtuse, cuneate at base and nearly sessile, very coarsely crenate, scabrous; peduncles usually longer than the leaves, the heads 2 cm. broad, not elongate; corolla pink.

11. **Lippia nutans** Robins. & Greenm. Amer. Journ. Sci. 50: 162. 1895.
Puebla, Oaxaca, and Chiapas; type from Las Joyas Canyon, Oaxaca, altitude 1,350 meters.
Shrub, 1.5 to 2.5 meters high; leaves short-petiolate, ovate to elliptic or broadly ovate, 1.5 to 4.5 cm. long, acute or obtuse at base and apex, crenate, rugose and scabrous above, tomentose or hirtellous beneath; heads in fruit 3 cm. broad or less, not elongate, the bracts ovate, pale.

12. **Lippia callicarpaefolia** H. B. K. Nov. Gen. & Sp. 2: 268. 1817.
Lippia bicolor Kunth, Ind. Sem. Hort. Berol. 1845.
Lippia calocephala Zucc. Ind. Sem. Hort. Monac. 1846.
Lippia bracteosa Mart. & Gal. Bull. Acad. Brux. 11: 326. 1844.
Mexico, Morelos and Puebla; type collected near the City of Mexico.
Shrub, 1.5 to 4.5 meters high, the branches short-hirsute; leaves short-petiolate, ovate, 5 to 10.5 cm. long, acute, abruptly decurrent at base, crenate, rugose and scabrous above, canescent-tomentose beneath; peduncles very slender, numerous, the heads purple, about 2 cm. broad, the bracts broadly ovate, acute. "Salvia real" (Puebla, *Ramírez*); "rosa de Castilla" (Morelos).

13. **Lippia umbellata** Cav. Icon. Pl. 2: 75. *pl. 194.* 1793.
Lippia substrigosa Turcz. Bull. Soc. Nat. Moscou 1863²: 202. 1863.
Lippia pringlei Briq. Bull. Herb. Boiss. 4: 340. 1896.
Lippia chiapensis Loesener, Verh. Bot. Ver. Brandenb. 53: 78. 1911.
Lippia albicaulis Greenm. Field Mus. Bot. 2: 340. 1912.

Sinaloa and Durango to Chiapas, Mexico, Veracruz, and Yucatán. Central America.

Shrub or tree, 1.5 to 12 meters high; leaves short-petiolate, narrowly lanceolate to broadly ovate, 6 to 20 cm. long, obtuse to attenuate, acute to rounded at base, finely or coarsely crenate, scabrous or scaberulous above, usually tomentose beneath; heads very numerous, long-pedunculate, in fruit 1 to 2 cm. thick, the bracts commonly reniform or broadly ovate-cordate; flowers yellowish, turning red. "Nacare," "topozana" (Sinaloa); "tabaquillo" (Michoacán); "hierba de la mula" (Durango); "salvia," "rosa de Castilla"; "caragra" (Costa Rica); "seca-leche" (Guatemala, Honduras); "juanislama de monte" (Nicaragua); "oreganillo," "orégano montés" (El Salvador).

In Durango the plant is used as a remedy for colic. The numerous specimens at hand show considerable variation, especially in pubescence and size of heads, but there do not appear to be any well-marked characters by which it is possible to distinguish the proposed segregates.

14. Lippia myriocephala Schlecht & Cham. Linnaea **5**: 98. 1830.

Lippia myriocephaloides Briq. Ann. Cons. Jard. Bot. Genève 4: 235. 1900.

Lippia hypoleia Briq. Ann. Cons. Jard. Bot. Genève 4: 236. 1900.

?*Lippia jurgenseni* Briq. Ann. Cons. Jard. Bot. Genève 4: 239. 1900.

?*Lippia yucatana* Loesener, Repert. Sp. Nov. Fedde 9: 364. 1911.

San Luis Potosí, Veracruz, Oaxaca, and Chiapas; type material collected near Jalapa and Papantla, Veracruz. Guatemala and El Salvador.

Shrub or tree, 3 to 9 meters high; leaves short-petiolate, lanceolate or lanceoblong, 6 to 18 cm. long, usually long-acuminate, acute to attenuate at base, scaberulous or smooth above, sparsely puberulent or glabrate beneath or sometimes tomentose, entire or finely serrulate; heads numerous, on long slender peduncles, globose or somewhat elongate, 5 to 7 mm. thick; flowers lilac. "Palo de gusano" (Veracruz); "tatascamite" (Guatemala); "tatascame," "tamayagua," "oreganillo," "salvia" (El Salvador).

Lippia yucatana was described from Yucatán. The writer has seen no Yucatán specimens of *L. myriocephala*, and it may therefore be that *L. yucatana* is a distinct species, or possibly a synonym of *L. umbellata*.

15. Lippia appendiculata Robins. & Greenm. Proc. Amer. Acad. **29**: 390. 1894.

Coahuila and Durango; type from Mapimi Desert, Durango.

Plants procumbent, suffrutescent, much branched; leaves lanceolate, 8 to 15 mm. long, grayish-strigose or scabrous; heads elongate in age, 2 cm. long or less; corolla purplish, 5 mm. long.

In general appearance the plant is like some of the species of *Verbena*.

16. Lippia stoechadifolia (L.) H. B. K. Nov. Gen. & Sp. **2**: 265. 1817.

Verbena stoechadifolia L. Sp. Pl. 19. 1753.

San Luis Potosí, Veracruz, Oaxaca, and Yucatán. West Indies and northern South America.

Shrub, 0.5 to 2 meters high; leaves linear-oblong, coarsely dentate, stiff, strigose-scabrous; heads long-pedunculate, in fruit 1 to 2.5 cm. long, about 6 mm. thick; flowers pale lilac or whitish. "Té del país," "cabalyaxnic" (Yucatán); "poley" (Porto Rico).

17. Lippia fastigiata T. S. Brandeg. Proc. Calif. Acad. II. **2**: 196. 1889.

Baja California; type from San Benito.

Densely branched shrub, 30 to 60 cm. high, cinereous-puberulent; leaves coarsely dentate, sessile, revolute; heads long-pedunculate, solitary; flowers pink or purple. "Damiana."

The leaves are much used as a substitute for Chinese tea.

18. **Lippia dulcis** Trevir. Nov. Act. Acad.. Nat. Cur. 13[1]: 187. 1826.

Tamaulipas, Veracruz, Morelos, Oaxaca, and Yucatán. Central America, West Indies, and Colombia.

Plants shrubby or suffrutescent, erect or procumbent, usually less than 60 cm. high; leaves long-petiolate, coarsely crenate, obtuse or acute, green; heads elongate in age, about 6 mm. in diameter; flowers white. "Hierba dulce" (Tamaulipas, Veracruz); "neuctixihuitl" (Nahuatl, *Ramírez;* "honey-herb"); "hierba buena" (Oaxaca, *Reko*); "orozuz" (Cuba, El Salvador, Costa Rica, Nicaragua); "orozul" (Nicaragua); "salvia santa," "corronchocho" (El Salvador).

Tea made from the plant is a common remedy for colic and colds.

19. **Lippia geminata** H. B. K. Nov. Gen. & Sp. 2: 2666. 1817.

Lantana lippioides Hook. & Arn. Bot. Beechey Voy. 305. 1839–40.

Sinaloa to Tamaulipas, Veracruz, and Oaxaca. West Indies; western Texas; Central and South America.

Shrub, usually a meter high or less; leaves short-petiolate, 3 to 6 cm. long, rounded to acute at apex, decurrent at base, scabrous above, crenate; heads somewhat elongate in fruit, 6 to 7 mm. thick; flowers pink or purple. "Hierba buena" (Jalisco, Veracruz, Oaxaca); "té del país" (Tabasco, *Rovirosa*); "té de maceta," "té del pan" (Oaxaca, *Reko*); "mirto" (Tamaulipas); "hierba del negro" (Tamaulipas); "Juanilama," "juanislama" (Costa Rica, Guatemala, Nicaragua); "salvia" (Cuba); "sonora" (Sinaloa); "mastranto" (Panama).

The plant is reputed to have sudorific, antispasmodic, stomachic, and emmenagogue properties.

DOUBTFUL SPECIES.

LIPPIA AMERICANA L. Sp. Pl. 633. 1753. Type from Veracruz.

8. LANTANA L. Sp. Pl. 626. 1753.

Large or small shrubs; leaves opposite or ternate, toothed; flowers small, in dense axillary heads or spikes, bracteate; calyx small, truncate or sinuate-dentate; corolla tube cylindric, the limb 4 or 5-lobate; stamens 4; fruit a small drupe containing a 2-celled stone.

Outer bracts not involucre-like, linear or linear-lanceolate, not exceeding the inner ones, usually much shorter than the corolla tube; stems often prickly ..... **1. L. camara.**

Outer bracts forming an involucre, ovate or lance-ovate or, if narrow, elongate and much exceeding the inner ones, usually almost or quite equaling the corolla tube; stems not prickly.

Heads not elongating during or after anthesis or scarcely so.

Leaves tomentose or pubescent beneath over nearly the whole surface, the pubescence chiefly spreading ..... **2. L. involucrata.**

Leaves hispidulous-strigose beneath along the larger veins ..... **3. L. hispida.**

Heads conspicuously elongate during and after anthesis.

Peduncles, at least most of them, equaling or much shorter than the leaves.

Leaves chiefly ternate, 7 to 15 cm. long; stems commonly hirsute. **4. L. trifolia.**

Leaves chiefly opposite, 1.5 to 5 cm. long; stems strigose ..... **5. L. canescens.**

Peduncles, all or most of them, twice as long as the leaves or longer.

Heads in anthesis 8 to 10 mm. thick ..... **6. L. macropoda.**

Heads mostly 13 to 16 mm. thick ..... **7. L. achyranthifolia.**

1. Lantana camara L. Sp. Pl. 627. 1753.
Lantana aculeata L. Sp. Pl. 627. 1753.
Lantana horrida H. B. K. Nov. Gen. & Sp. 2: 261. 1817.
?*Lantana mollis* Graham, Edinburgh New Phil. Journ. 1829: 184. 1829.
Lantana hirsuta Mart. & Gal. Bull. Acad. Brux. 11: 326. 1844.
Lantana polyacantha Schauer in DC. Prodr. 11: 597. 1847.

Nearly throughout Mexico. Widely distributed in tropical America and naturalized in the Old World.

Shrub, 1 to 4 meters high, usually armed with stout recurved prickles; leaves rounded-ovate to oblong-ovate, 4 to 12 cm. long, acute or short-acuminate, sometimes obtuse, acute to subcordate at base, crenate, scabrous above, variously pubescent or occasionally glabrate beneath; heads not elongating; corolla yellow or orange, changing to red or purple, the tube about 1 cm. long; fruit black, 3 mm. long. "Hierba de Cristo" (Tamaulipas); "cinco negritos" (Veracruz, El Salvador, Guatemala, Nicaragua); "tres colores" (Michoacán, Guerrero); "zapotillo" (Oaxaca, *Seler*); "uña de gato" (Morelos); "palabra de mujer" (Sinaloa, Veracruz); "orozuz del país" (Veracruz); "alfombrilla hedionda" (Michoacán, *Ramírez*); "flor de San Cayetano" (Veracruz, Puebla, *Urbina*); "xo-hexnuc" (Yucatán, Maya); "siete colores" (Jalisco); "peonía negra" (Tamaulipas); "mora" (Colima; fruit); "matizadilla" (Oaxaca, Jalisco); "confituria" (Sonora, Sinaloa); "alantana," "lampana," "lantana" (Veracruz, etc.); "sonora roja," "sonora," "confite negro," "confite," "zarzamora" (Sinaloa); "corronchocho" (Guatemala); "sorrito" (Colombia); "cariaquillo," "poley cimarrón" (Porto Rico); "comida de paloma" (Guatemala, Honduras); "filigrana" (Cuba); "venturosa colorada" (Venezuela); "San Rafaelito" (Panama); "santo negrito," "cinco coloraditos" (El Salvador).

The lantana is a rather showy shrub when in flower and it is often planted for ornament and grown in hothouses. The plants bloom nearly all the year. This species has been introduced into most tropical countries, and in some of them, as in Hawaii, it has become a troublesome weed. The fruit is sweet and edible but not very palatable. A decoction of the leaves is sometimes employed as a remedy for rheumatism and as a tonic for the stomach. In Sinaloa the plant is a favorite remedy for snake bites, a strong decoction of the leaves being taken internally and a poultice of crushed leaves applied to the wound.

2. Lantana involucrata L. Cent. Pl. II. 22. 1756.
Lantana odorata L. Syst. Nat. ed. 12. 418. 1767.
Lantana velutina Mart. & Gal. Bull. Acad. Brux. 11: 325. 1844.

Nearly throughout Mexico. Florida, Texas, West Indies, and northern South America.

Shrub, 0.5 to 4 meters high; leaves ovate to oblong-ovate, elliptic, or rounded, 1 to 6 cm. long, rounded to acute at apex, finely or coarsely crenate, puberulent or tomentose beneath, usually scabrous above; peduncles longer or shorter than the leaves; corolla lilac or white, the tube 6 to 8 mm. long; fruit blue, 3 to 4 mm. long. "Orégano" (Tamaulipas); "tarepe" (Michoacán); "peonía colorada" (Tamaulipas); "confite" (Sinaloa); "cuasquito oloroso" (Nicaragua); "salvia santa," "orégano del monte" (Guatemala); "cariaquillo de Santa María," "Santa María" (Porto Rico); "hierba de la sangre," "filigrana cimarrona," "té de costa" (Cuba); "chiligüe," "cinco negritos" (El Salvador).

The flowers are fragrant and the whole plant, as in other species, has a strong aromatic odor. Palmer reports that in Tamaulipas pieces of the leaves or stems are put in the ears as a cure for deafness.

The only Mexican specimens which are exactly like the West Indian ones are those from Yucatán. In the West Indian plant the leaves are usually rounded at the apex and finely crenate, while in the common Mexican form (*L. velutina*) the leaves are more commonly acute or acutish, more coarsely crenate, and more copiously pubescent. There are, however, some intermediate forms, and it does not seem advisable to consider *L. velutina* a distinct species.

3. **Lantana hispida** H. B. K. Nov. Gen. & Sp. 2: 260. 1817.

?*Lantana hirta* Graham, Edinburgh New Phil. Journ. 2: 186. 1826.

Lantana teucriifolia Otto & Dietr. Allg. Gartenz. 9: 371. 1841.

Lantana geroldiana Otto & Dietr. Allg. Gartenz. 9: 372. 1841.

Veracruz, Puebla, Oaxaca, and Chiapas; type from Jalapa, Veracruz. Central America.

Shrub; leaves ovate-oblong to elliptic or ovate, 3 to 9 cm. long, acute or acuminate, acute or obtuse at base, crenate, scabrous above; peduncles equaling or shorter than the leaves; corolla lilac or white, the tube 5 to 6 mm. long. "Orozuz del país" (Veracruz); "toltolquelite" (Nicaragua).

Said to be used in Veracruz as a domestic remedy for tuberculosis.

4. **Lantana trifolia** L. Sp. Pl. 626. 1753.

Veracruz and Chiapas. West Indies; Central and South America.

Shrub; leaves lanceolate to ovate, acute to long-acuminate, decurrent at base, coarsely crenate, scabrous above, puberulent beneath; corolla lilac, the tube 5 to 6 mm. long; fruit purple, sweet, edible. "Filigrana de piña" (Cuba); "icaquito" (El Salvador).

5. **Lantana canescens** H. B. K. Nov. Gen. & Sp. 2: 259. 1817.

Coahuila to Tamaulipas, San Luis Potosí, Veracruz, and Yucatán. South America; type from Venezuela.

Shrub; leaves lanceolate to elliptic-ovate, acute or acuminate, finely crenate or subentire, densely strigose; heads 6 to 7 mm. thick; corolla white.

6. **Lantana macropoda** Torr. U. S. & Mex. Bound. Bot. 127. 1859.

Chihuahua, Coahuila, and Durango. Western Texas; type from the Rio San Pedro.

Shrub, 1 meter high or less; leaves oblong-ovate to broadly ovate, 1 to 4.5 cm. long, obtuse or acute, coarsely crenate-serrate, strigose; corolla white or purple.

7. **Lantana achyranthifolia** Desf. Cat. Pl. Paris. ed. 3. 392. 1829.

Lippia purpurea Jacq. Eclog. Amer. 1: 126. *pl. 58.* 1816. Not *Lantana purpurea* Hornem. 1815.

Lantana macropodioides Greenm. Field Mus. Bot. 2: 339. 1912.

Sonora and Chihuahua to Tamaulipas, Veracruz, and Chiapas. Central and South America.

Shrub, a meter high or less; leaves narrowly lanceolate to broadly ovate, mostly 4 to 8 cm. long, acuminate, coarsely and sharply serrate, densely strigose; corolla purple or whitish.

DOUBTFUL SPECIES.

LANTANA MULTICOLOR Lem. Fl. Serr. Jard. 3: Misc. 5. 1847. Described from cultivated plants grown from Mexican seeds. Perhaps a species of *Lippia*.

9. AVICENNIA L. Sp. Pl. 110. 1753.

1. Avicennia nitida Jacq. Enum. Pl. Carib. 25. 1760.

In mangrove swamps along both coasts of Mexico, from Baja California and Tamaulipas southward. Widely distributed in tropical America.

Shrub or tree, sometimes 25 meters high, with a trunk 60 cm. in diameter; bark thin, dark brown, shallowly fissured; leaves opposite, short-petiolate, oblong or oblong-lanceolate, 5 to 10 cm. long, obtuse, acute at base, leathery, entire, green and glabrate above, beneath very minutely and densely white-puberulent; flowers in headlike axillary and terminal cymes; calyx campanulate, 5-lobate; corolla white, sericeous, the tube short, the limb 5-lobate, about 1 cm. broad; fruit an oblique 2-valvate capsule; wood hard, close-grained, dark brown, its specific gravity about 0.91. "Mangle blanco" (Veracruz, Oaxaca, Tabasco, Yucatán, Porto Rico, Cuba); "mangle prieto" (Cuba, Colombia); "mangle negro" (Cuba); "culumate" (Costa Rica); "chifle de vaca," "mangle bobo" (Porto Rico); "palo de sal" (Nicaragua, Costa Rica); "manglecito" (Colombia); "puyeque" (Sinaloa); "mangle," "mangle salado" (Panama); "árbol de sal," "istatén," "ishtatén" (El Salvador).

The wood is used for many purposes, and the bark is employed in tanning. The flowers are much sought by bees. The usual English name of the plant is "black mangrove."

10. CORNUTIA L. Sp. Pl. 628. 1753.

Shrubs or small trees; leaves opposite, entire or dentate; flowers small, violet, in cymes, these arranged in large terminal panicles; calyx small, campanulate, sinuate-dentate, not enlarged in fruit; corolla tube straight or curved, the limb 4-lobate; perfect stamens 2, 2 staminodia also present; fruit a small globose drupe.

Corolla minutely glandular-puberulent, the tube 2 mm. thick or less. 1. C. pyramidata.

Corolla villosulous, the tube about 3 mm. thick 2. C. grandifolia.

1. Cornutia pyramidata L. Sp. Pl. 628. 1753.

Hosta latifolia H. B. K. Nov. Gen. & Sp. 2: 248. 1817.

Yucatán. West Indies and Central America.

Large shrub or small tree; leaves petiolate, ovate to rounded-ovate, 9 to 30 cm. long, acuminate, usually long-decurrent at base, densely and minutely pubescent; panicles thyrsiform, longer than the leaves; corolla tube slender, about 8 mm. long. "Palo cuadrado" (Panama); "hoja de zope," "hoja de jope" (Guatemala, Honduras); "pavilla" (Costa Rica); "cuatro caras" (Panama).

This species has been reported from elsewhere in Mexico, but the writer has seen only Yucatán specimens. Rovirosa reports it from Tabasco, where it may very likely occur, with the vernacular name "pangagé." The plant is said to yield a yellow dye.

2. Cornutia grandifolia (Schlecht. & Cham.) Schauer in DC. Prodr. 11: 682. 1847.

Hosta grandifolia Schlecht. & Cham. Linnaea 5: 97. 1830.

Veracruz and Chiapas; type from Jalapa, Veracruz. Central America.

Small tree; leaves petiolate, ovate to broadly elliptic, 10 to 25 cm. long, acute or acuminate, decurrent at base, often dentate, usually densely pilose beneath; corolla tube stout, curved, 5 to 6 mm. long. "Pavilla" (Costa Rica).

DOUBTFUL SPECIES.

CORNUTIA LONGIFOLIA (H. B. K.) Spreng. Syst. Veg. 1: 39. 1825. *Hosta longifolia* H. B. K. Nov. Gen. & Sp. 2: 247. 1817. The type locality is given doubtfully as Mexico. The corolla is described as glabrous.

11. CLERODENDRUM L. Sp. Pl. 637. 1753.

Trees or shrubs, sometimes scandent; leaves opposite or ternate, entire or dentate; flowers large or small, in axillary or terminal cymes; calyx campanulate, truncate or 5-dentate; corolla tube straight or curved, the limb spreading, 4 or 5-lobate; stamens 4; fruit a globose or 4-lobate drupe, containing 4 nutlets.

Cymes axillary; leaves entire ..... 1. C. ligustrinum.
Cymes terminal; leaves sinuate-dentate ..... 2. C. fragrans.

1. Clerodendrum ligustrinum (Jacq.) R. Br.; Ait. Hort. Kew. ed. 2. 4: 64. 1812.

Volkameria ligustrina Jacq. Coll. Bot. Suppl. 118. *pl. 5, f. 1.* 1796.

Clerodendrum mexicanum T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 391. 1909.

Aegiphila paludosa T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 191. 1915.

Tamaulipas, Veracruz, Yucatán, Campeche, Tabasco, Puebla, and Oaxaca.

Shrub, 1.5 to 3 meters high; petiole bases indurate and persistent; leaves ovate to elliptic-oblong, 4 to 10 cm. long, acute or acuminate, abruptly short-decurrent at base, glabrous or nearly so, punctate beneath; cymes pedunculate, few-flowered, sometimes longer than the leaves; calyx 6 to 8 mm. long; corolla white, the tube slender, about 1 cm. long, longer than the lobes; fruit about 1 cm. in diameter. "Muste" (Tabasco).

This has been reported from Yucatán as *C. aculeatum* (L.) Schlecht., but it is quite distinct from that West Indian species.

2. Clerodendrum fragrans Vent. Jard. Malm. 2: *pl. 70.* 1804.

Commonly cultivated in Mexico and sometimes naturalized; specimens seen from Nuevo León, Veracruz, and Yucatán. Native of southeastern Asia; cultivated and naturalized in tropical America.

Plants suffrutescent, 0.5 to 1.5 meters high; leaves long-petiolate, broadly deltoid-ovate or rounded-ovate, 10 to 30 cm. long, usually truncate at base; flowers in very dense terminal cymes, fragrant; corolla white, about 2.5 cm. long. "Bocamelia" (Oaxaca, El Salvador, Nicaragua); "metroceder" (Oaxaca, *Reko*); "jazmín de Amelia" (Guatemala); "camelia" (Panama); "viuda alegre" (El Salvador).

The form cultivated in tropical America has double flowers; it is *C. fragrans pleniflora* Schauer.[1]

12. PETITIA Jacq. Enum. Pl. Carib. 1. 1760.

1. Petitia oleina (Benth.) Benth. & Hook; Hemsl. Biol. Centr. Amer. Bot. 2: 539. 1882.

Scleroon oleinum Benth. in Edwards, Bot. Reg. 29: Misc. 65. 1843.

Described from cultivated plants grown from Mexican seeds.

Shrub; leaves opposite, entire; flowers greenish white, in few-flowerd axillary cymes; calyx campanulate, shortly 4-dentate; corolla funnelform, the limb 4-lobate; stamens 4; fruit a 4-celled drupe.

Known to the writer only from the original description.

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[1]In DC. Prodr. 11: 666. 1847.

13. CALLICARPA L. Sp. Pl. 111. 1753.

Shrubs or trees, the pubescence usually stellate; leaves opposite, serrate or entire; flowers small, in large axillary cymes; calyx short-campanulate, truncate or 4-dentate; corolla tube short, the limb spreading, 4-lobate, the lobes equal, imbricate; fruit drupaceous, globose or depressed, the endocarp separating into 4 or fewer nutlets.

Leaves obovate, very obtuse.....1. C. parvifolia.
Leaves lanceolate to ovate, acute or acuminate.
Leaves persistently but minutely stellate-pubescent on the upper surface.
2. C. acuminata.
Leaves glabrous on the upper surface except when very young.
Leaves densely stellate-tomentose beneath.....3. C. pringlei.
Leaves sparsely stellate-pubescent beneath.....4. C. subpubescens.

1. Callicarpa parvifolia Hook. & Arn. Bot. Beechey Voy. 305. 1839–40.

Type said to have come from Tepic.

Leaves coriaceous, 3.5 cm. long, short-petiolate, slightly crenate, glabrous above in age, densely grayish-tomentose beneath and reticulate-veined; peduncles equaling the petioles, the flowers capitate-cymose.

2. Callicarpa acuminata H. B. K. Nov. Gen. & Sp. 2: 252. 1817.

Tamaulipas, Veracruz, Yucatán, and Oaxaca. Guatemala to Colombia; type from Colombia.

Shrub or small tree, 1 to 6 meters high; leaves short-petiolate, ovate to oblong-serrate, lanceolate, 5 to 20 cm. long, entire or serrate, densely stellate-tomentulose beneath; cymes dense, many-flowered, usually less than half as long as the leaves; corolla white, about 3 mm. long; fruit black, 5 mm. in diameter. "Sac pukim" (Yucatán, Maya); "uvilla" (Tamaulipas); "vara del alcalde" (Honduras).

This is probably the plant reported as *C. americana* by Sessé and Mociño,[1] who state that its Totonac name is "patzahumacachil."

3. Callicarpa pringlei Briq. Bull. Herb. Boiss. 4: 345. 1896.

San Luis Potosí; type from Tamasopo Canyon.

Shrub, about 4.5 meters high, the young branches densely stellate-tomentose; leaves petiolate, lanceolate to ovate, 10 to 16 cm. long, serrate-dentate, thick, rugose above; cymes many-flowered, half as long as the leaves or shorter; corolla white, 3 to 4 mm. long; fruit about 4 mm. in diameter.

Rather doubtfully distinct from *C. acuminata*.

4. Callicarpa subpubescens Hook. & Arn. Bot. Beechey Voy. 305. 1839–40.

Type said to have come from Tepic.

Leaves petiolate, oblong-lanceolate, 5 cm. wide or less, attenuate at each end, serrate; peduncles equaling the petioles.

14. AEGIPHILA Jacq. Obs. Bot. 2: 3. 1764.

1. Aegiphila deppeana Steud. Nom. Bot. ed. 2. 1: 29. 1840.

Aegiphila brachiata Schlecht. & Cham. Linnaea 6: 371. 1831. Not *A. brachiata* Vell. 1825.

Aegiphila pacifica Greenm. Proc. Amer. Acad. 33: 485. 1898.

Tepic and Veracruz; type from Estero (Tamaulipas?). Reported from Panama.

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[1] Fl. Mex. 18. 1893.

Shrub or small tree, 2.5 to 7 meters high; leaves opposite, petiolate, ovate or oblong-ovate, 5 to 15 cm. long, acuminate, acute to rounded at base, entire, glabrate above, beneath tomentulose or glabrate; cymes in terminal panicles; calyx about 4 mm. long, obtusely 4-dentate; corolla white, glabrous, 10 to 12 mm. long, the tube ampliate above; fruit drupaceous, yellow, 6 to 8 mm. in diameter, the calyx persistent and cuplike at its base.

147. MENTHACEAE. Mint Family.

Shrubs or small trees or often herbs, usually aromatic; stems commonly quadrangular; leaves opposite or verticillate, simple; flowers perfect, irregular, small or large; calyx inferior, persistent, gamosepalous, 5-dentate or bilabiate; corolla gamopetalous, the limb 5-lobate or 4-lobate, usually bilabiate; stamens 4 or 2, attached to the corolla tube; style filiform, usually bifid at apex; fruit commonly of 4 small 1-seeded nutlets.

The family is often known by the name *Labiatae*. Several genera are represented in Mexico only by herbaceous species.

Fertile stamens 2.
- Anther cells linear.
  - Upper lip of corolla spreading ..... **1. RAMONA.**
  - Upper lip of corolla erect ..... **2. SALVIA.**
- Anther cells oblong.
  - Stamens distant, straight ..... **3. CUNILA.**
  - Stamens ascending, converging, usually arcuate ..... **4. POLIOMINTHA.**

Fertile stamens 4.
- Calyx closed after anthesis.
  - Calyx gibbous, not inflated ..... **5. SCUTELLARIA.**
  - Calyx not gibbous, inflated ..... **6. SALAZARIA.**
- Calyx open after anthesis.
  - Upper lip of the calyx decurrent upon the tube ..... **7. OCIMUM.**
  - Upper lip of the calyx not decurrent.
    - Nutlets rugose-reticulate ..... **8. TRICHOSTEMA.**
    - Nutlets smooth or granular.
      - Calyx bilabiate ..... **9. CLINOPODIUM.**
      - Calyx not bilabiate, the 5 teeth equal or nearly so.
        - Stamens declined toward the lower lip of the corolla. **10. HYPTIS.**
        - Stamens not declined.
          - Flowers in a terminal head ..... **11. MONARDELLA.**
          - Flowers chiefly axillary, or in terminal racemes.
            - Leaves hastate; calyx campulate ..... **12. SPHACELE.**
            - Leaves not hastate; calyx tubular ..... **13. GARDOQUIA.**

1. RAMONA Greene, Pittonia 2: 235. 1892.

Low shrubs; leaves entire or crenate; flower clusters in interrupted spikes or sometimes paniculate; calyx bilabiate, the posterior lip entire or minutely 3-dentate, the anterior lip bifid; corolla tube equaling or longer than the calyx, the limb bilabiate; perfect stamens 2.

Bracts scarious-membranaceous, colored.
- Leaves entire ..... **1. R. pachystachya.**
- Leaves crenulate ..... **2. R. capitata.**

Bracts herbaceous.

Inflorescence thyrsoid-paniculate. Tube of the corolla shorter than the limb. **3. R. polystachya.**

Inflorescence verticillate-spicate.

Corolla about 1 cm. long----------**4. R. stachyoides.**

Corolla nearly or fully 2 cm. long.

Outer bracts acute or short-mucronate----------**5. R. clevelandi.**

Outer bracts with long aristate tips----------**6. R. vaseyi.**

1. Ramona pachystachya (A. Gray) Heller, Muhlenbergia 1: 4. 1900.

Audibertia incana pachystachya A. Gray, Syn. Fl. ed. 2. 2[1]: 461. 1886.

Audibertia pachystachya Parish, Erythea 6: 91. 1898.

Mountains of Baja California. California; type from San Bernardino Mountains.

Leaves spatulate, 2 to 4 cm. long, rounded at apex, attenuate at base to a slender petiole, minutely canescent-tomentulose or glabrate; inflorescence verticillate-spicate; bracts large, oval or rounded, purplish; corolla nearly 2 cm. long.

2. Ramona capitata (A. Gray) Briq. Bull. Herb. Boiss. 2: 440. 1894.

Audibertia capitata A. Gray, Proc. Amer. Acad. 7: 387. 1867.

Northwestern Sonora. Southern California; type from Providence Mountains.

Leaves oblong or ovate-oblong, 1 to 2 cm. long, obtuse, acute at base, slender-petiolate, very rugose, minutely tomentulose; flowers in terminal solitary heads, the bracts whitish; corolla nearly 2 cm. long.

3. Ramona polystachya (Benth.) Greene, Pittonia 2: 235. 1892.

Audibertia polystachya Benth. Lab. Gen. & Sp. 314. 1833.

Northern Baja California. California.

Shrub, about 1 meter high, densely white-tomentulose throughout; leaves lance-oblong, 5 to 8 cm. long, obtuse, acute at base; corolla white or nearly so, about 1 cm. long.

The white sage is a very common shrub in southern California and it is an important honey plant. The Indians of the region gather large quantities of the seeds, parch them, and grind them into meal in a mortar. The meal is stirred into water and salted, thus forming pinole, which is eaten or drunk.

4. Ramona stachyoides (Benth.) Briq. Bull. Herb. Boiss. 2: 440. 1894.

Audibertia stachyoides Benth. Lab. Gen. & Sp. 313. 1833.

Baja California. California.

Shrub, about 1 meter high; leaves oblong-lanceolate or oblanceolate, mostly 1.5 to 2.5 cm. long, obtuse, attenuate at base, glabrate and green above, tomentulose beneath; corolla white or lilac.

Known in California as "black sage"; like *R. polystachya*, an important honey plant.

5. Ramona clevelandi (A. Gray) Briq. Bull. Herb. Boiss. 2: 440. 1894.

Audibertia clevelandi A. Gray, Proc. Amer. Acad. 10: 76. 1874.

Northern Baja California. Southern California; type collected near San Diego.

Leaves oblong or lance-oblong, 2 to 7 cm. long, obtuse, acute at base, cinereous-tomentulose; bracts usually tinged with purple.

6. Ramona vaseyi (Porter) Briq. Bull. Herb. Boiss. 2: 440. 1894.
Audibertia vaseyi Porter, Bot. Gaz. 6: 207. 1881.
Northern Baja California. Southern California; type from San Diego County.
Leaves oblong or lance-oblong, 2 to 5 cm. long, obtuse, acute at base, cinereous-tomentulose beneath, often glabrate above.

2. SALVIA L. Sp. Pl. 23. 1753.

REFERENCE: Fernald, A synopsis of the Mexican and Central American species of *Salvia*, Proc. Amer. Acad. 35: 489–556. 1900.
Shrubs or herbs; leaves entire or toothed; flowers small or large, usually verticillate and racemose; calyx 2-lipped, the upper lip entire or 3-dentate, the lower bidentate; corolla conspicuously bilabiate; fertile stamens 2.
Many herbaceous species occur in Mexico, at least 100 or more. The best-known plant of the genus is *Salvia officinalis* L., the garden sage, a native of the Old World, whose aromatic leaves are used for flavoring food. Some of the herbaceous species are known in Mexico as "chía," and a favorite beverage, known by the same name, is prepared by soaking the mucilaginous seeds in water.

Calyx densely lanate with purplish wool.
Leaves linear-lanceolate; corolla white----------1. S. leucantha.
Leaves ovate, subcordate at base; corolla reddish.
Leaves very rugose, 2.5 to 4 cm. long; petioles 4 to 8 mm. long.
2. S. lantanaefolia.
Leaves scarcely rugose, 5 to 10 cm. long; petioles 1.5 to 2.5 cm. long.
3. S. populifolia.
Calyx not lanate or, if so, the wool not purplish.
A. Corolla commonly less than 2 cm. long, blue or white.
Bracts of the inflorescence large, persistent, firm, and leaflike.
Leaves 1.5 to 5 cm. long----------4. S. nelsonii.
Leaves mostly 7 to 15 cm. long.
Leaves tomentose beneath----------5. S. shannoni.
Leaves glabrous beneath except along the costa--------6. S. collinsii.
Bracts small, never leaflike, usually deciduous.
B. Leaves oblong or lanceolate or, if ovate, not cordate at base.
Calyx densely lanate.
Leaves crenulate----------7. S. confinis.
Leaves coarsely dentate----------8. S. californica.
Calyx canescent, pubescent, or tomentose, not lanate.
C. Leaves entire or essentially so.
Leaves sessile or subsessile, narrowly oblong or linear, strongly revolute.
Leaves linear, glabrous above; calyx glabrate--9. S. fasciculata.
Leaves narrowly oblong, tomentulose above; calyx glandular-pilose----------10. S. coulteri.
Leaves, except sometimes the uppermost, petiolate.
Leaves usually narrowly triangular-ovate, truncate at base.
11. S. candicans.
Leaves narrowly ovate or oblong, attenuate or rounded at base.
Calyx lobes obtuse.
Calyx glandular-pubescent----------12. S. thymoides.
Calyx without glandular pubescence---13. S. chionophylla.

Calyx lobes acuminate.
Leaves ovate or ovate-oblong, 3 to 7 mm. long, all slender-petiolate----------14. S. serpyllifolia.
Leaves oblong, 10 to 25 mm. long, the uppermost subsessile.
Leaves finely stellate-pubescent, at least when young.
15. S. coahuilensis.
Leaves glabrous----------16. S. lycioides.
CC. Leaves crenate or crenate-serrate.
Calyx lobes becoming much broadened in age, the calyx funnelform.
Leaves green above, usually rugose, regularly crenate.
Calyx finely and closely tomentose------17. S. ballotaeflora.
Calyx loosely and coarsely stellate-tomentose.
18. S. ramosa.
Leaves very pale on both surfaces, irregularly crenate.
19. S. platycheila.
Calyx lobes not broadened in age or scarcely so.
Mature leaves glabrous----------20. S. similis.
Mature leaves pubescent on one or both surfaces.
Pubescence of the leaves of stellate hairs.
Stems very densely and finely white-tomentulose; verticels 6 to 10-flowered----------21. S. cedrosensis.
Stems thinly stellate-tomentose; verticels 2 to 6-flowered.
22. S. chamaedryoides.
Pubescence of the leaves not stellate.
Leaves obtuse, densely viscid-pubescent on the upper surface.
23. S. purpusii.
Leaves acuminate, glabrous or nearly so on the upper surface.
Upper leaves sessile; flowers cymose-paniculate.
24. S. dasycalyx.
Upper leaves long-petiolate; inflorescence racemose.
25. S. fallax.
BB. Leaves ovate or broadly ovate, usually cordate at base.
Leaves glabrous beneath or sparsely puberulent along the nerves.
4. S. nelsonii.
Leaves, at least when young, densely pubescent or tomentose beneath.
D. Leaves stellate-pubescent beneath, at least when young.
Calyx densely white-lanate----------26. S. rubropunctata.
Calyx stellate-tomentose, not lanate except sometimes at base.
Leaves 1 to 1.5 cm. long----------27. S. fruticulosa.
Leaves 2 to 6 cm. long.
Branchlets and nerves of young leaves with sulphur-yellow tomentum----------28. S. conzattii.
Branchlets and lower surface of leaves with white tomentum.
Leaves broadly ovate, sharply crenate-dentate; calyx lobes obtuse----------29. S. pruinosa.
Leaves oblong-ovate, obtusely crenate; calyx lobes acute.
30. S. goldmanii.
DD. Leaves white-tomentose beneath with simple hairs.
E. Leaves very rugose above, usually broadly ovate, obtuse.
Pedicels very short, 3 mm. long or less; racemes rather dense; calyx in anthesis 4 to 5 mm. long.
Calyx glandular-villous----------31. S. scordoniaefolia.

Calyx without glandular pubescence.
Pubescence of the corolla glandular_____32. S. dugesii.
Pubescence of the corolla chiefly eglandular.
33. S. lasiantha.
Pedicels 3 to 9 mm. long; racemes loosely flowered; calyx in anthesis 6 mm. long or more.
Calyx purplish violet, glandular-villous, in anthesis nearly 10 mm. long_____34. S. semiatrata.
Calyx green or blue-tinged, glandular-puberulent and minutely hispidulous on the nerves, in anthesis about 6 mm. long.
Leaves oblong or narrowly ovate_____35. S. rupicola.
Leaves broadly ovate_____36. S. gonzalezii.
EE. Leaves only slightly rugose, narrow-ovate, mostly acuminate.
Flowers in small cymes, these arranged in a terminal thyrse.
37. S. thyrsiflora.
Flowers in simple or branched racemes.
Branches pubescent with soft ascending hairs.
38. S. multiramea.
Branches short-pilose with recurved-spreading hairs.
Calyx tubular, in fruit 5 mm. long, the tube 4 times as long as the lobes_____39. S. alamosana.
Calyx campanulate, in fruit 6 to 7 mm. long, the tube twice as long as the lobes_____40. S. chapalensis
AA. Corolla 2 to 12 cm. long, variously colored, often scarlet or yellow.
Corolla yellow.
Flowers axillary, solitary_____41 S. aspera.
Flowers racemose_____42. S. chrysantha.
Corolla not yellow.
Calyx inflated-campanulate. Corolla scarlet.
Stems viscid-hirsute_____43. S. adglutinans.
Stems not viscid-hirsute.
Leaves chiefly ovate-lanceolate to oblong, cuneate or narrowed at base_____44. S. sessei.
Leaves broadly ovate to orbicular.
Leaves pubescent beneath on the nerves, 4 cm. long or less; branches glabrate_____45. S. regla.
Leaves tomentose beneath, usually more than 4 cm. long; branches tomentose or puberulent.
Branches tomentose_____46. S. pubescens.
Branches puberulent_____47. S. muralis.
Calyx tubular-campanulate, not inflated.
F. Corolla ventricose, the tube straight.
G. Leaves 1 to 4 cm. long.
Flowers axillary_____48. S. disjuncta.
Flowers in terminal racemes.
Leaves narrowly oblong to linear-oblanceolate___49. S. greggii.
Leaves ovate or broadly oblong.
Pubescence of branches and leaves stellate__50. S. oaxacana.
Pubescence of branches and leaves simple.
Calyx glabrous, or barely puberulent at base_51 S. oresbia.
Calyx hispidulous on the nerves.
Leaves glabrous or glabrate beneath___52. S. grahami.

Leaves pubescent beneath.
Leaves mostly less than 2 cm. long--53. S. microphylla.
Leaves usually more than 2 cm. long.
Corolla 3.2 to 3.5 cm. long--------54. S. schaffneri.
Corolla 2.5 to 2.7 cm long.
Leaves thin, hardly rugose, subacuminate.
55. S. lemmoni.
Leaves rugose, usually rounded at apex.
56. S. neurepia.

GG. Leaves larger, all except the smallest more than 4 cm. long.
Leaves glabrous beneath or nearly so
Calyx herbaceous, the tube becoming corrugated, the lobes subequal----------57. S. pringlei.
Calyx less herbaceous, the tube not corrugated, the lobes unequal.
Leaves cuneate or obtuse at base--------58. S. involucrata.
Leaves mostly cordate at base----------59. S. pulchella.
Leaves pubescent beneath.
Corolla 2.5 to 2.7 cm. long----------60. S. adenophora.
Corolla 4 to 6 cm. long
Leaves densely white-tomentose beneath, finely crenate-serrate; calyx glandular-puberulent---------61. S. fulgens.
Leaves pilose beneath on the nerves, coarsely crenate; calyx not at all or very minutely glandular-puberulent.
62. S. orizabensis.

FF. Corolla not ventricose, the tube straight or curved.
Leaves cuneate or narrowed at base.
Leaves pubescent beneath; corolla rose-purple.
Corolla 1.5 to 1.8 cm. long.
Leaves ovate or oblong-ovate----------63. S. chiapensis.
Leaves oblong-lanceolate----------64. S. antennifera.
Corolla 2.5 to 4 cm. long----------65. S. curviflora.
Leaves glabrous beneath; corolla red----------66. S. miniata.
Leaves rounded or cordate at base.
Leaves cordate at base.
Corolla purple or pink----------67. S. aristulata.
Corolla scarlet.
Calyx in anthesis 1 cm. long----------68. S. cyclophylla.
Calyx 1.7 to 2 cm. long----------69. S. incana.
Leaves rounded or rounded-truncate at base, not definitely cordate.
Leaves lanceolate, 10 to 15 cm. long---------70. S. perlonga.
Leaves ovate or ovate-lanceolate, shorter.
G. Corolla purple or flesh-colored.
H. Leaves glabrous or minutely puberulent beneath.
Branches canescent-velutinous; flower clusters 2-flowered----------71. S. graciliflora.
Branches slightly pilose, puberulent, or glabrous; flower clusters several or many-flowered.
Glands (2) usually present at base of petiole; corolla 2 to 2.7 cm. long----------72. S. purpurea.
Glands absent; corolla 2.5 to 4 cm. long--73. S. littae.

HH. Leaves more or less pilose or tomentose beneath.
Pubescent stellate.
Calyx 12 to 13 mm. long----------74. S. rosei.
Calyx 5 mm. long----------75. S. arbuscula.
Pubescence not stellate.
Leaves merely pilose beneath.
Leaves broadly ovate; corolla deep purple-violet.
76. S. iodantha.
Leaves ovate-lanceolate; corolla flesh-colored.
77. S. michoacana.
Leaves velutinous or lanate beneath.
Leaves serrate; calyx lobes broad, mucronate.
78. S. nervata.
Leaves crenate; calyx lobes long-acuminate.
79. S. karwinskii.
GG. Corolla scarlet or vermilion.
Calyx lips unequal, the upper one produced into a subulate awn, the lower one short----------80. S. cinnabarina.
Calyx lips subequal.
Calyx lobes subulate-tipped----------81. S. elegans.
Calyx lobes not subulate-tipped.
Bracts 2 to 3 cm. long, persistent----82. S. mollissima.
Bracts smaller, deciduous----------83. S. coccinea.

1. Salvia leucantha Cav. Icon. Pl. 1: 16. *pl. 24.* 1791.
Salvia bicolor Sessé & Moc. Pl. Nov. Hisp. 8. 1887.
Zacatecas to Puebla and Morelos.

Plants chiefly herbaceous, sometimes suffrutescent below; leaves short-petiolate, 5 to 17 cm. long, attenuate, crenulate, green above, tomentose beneath; flowers in long racemes; calyx nearly 1 cm. long, covered with beautiful purple wool; corolla about 18 mm. long.

2. Salvia lantanaefolia Mart. & Gal. Bull. Acad. Brux. 11²: 69. 1844.
Puebla; type from Tehuacán.
Shrub; leaves obtuse, green above, tomentose beneath; flowers in dense racemes; calyx about 1 cm. long.

3. Salvia populifolia Fernald, Proc. Amer. Acad. 35: 530. 1900.
Type from Bolaños, Jalisco.
Shrub; leaves acute, crenulate, green and glabrate above, whitish-tomentose beneath; calyx in anthesis about 18 mm. long, the lobes acuminate; corolla 3.5 cm. long.

4. Salvia nelsonii Fernald, Proc. Amer. Acad. 35: 527. 1900.
Salvia albicans Fernald, Proc. Amer. Acad. 36: 501. 1901.
Guerrero, Puebla, and Morelos; type collected between Acatlán and Piaxtla, Puebla.
Shrub, 2.5 to 5 meters high, the branches cinereous-puberulent; leaves ovate, acute or acuminate, rounded at base, serrulate, finely canescent-puberulent; flowers in dense spikelike racemes; calyx 8 mm. long, densely white-tomentose, the lobes obtuse; corolla about 14 mm. long, blue and white.

5. Salvia shannoni Donn. Smith, Bot. Gaz. 19: 256. 1894.
Oaxaca and Chiapas. Guatemala; type from Volcán Chingo.
Shrub; leaves lanceolate to ovate, obtuse or cordate at base, acuminate, serrate or crenate-serrate, green above; racemes very thick and dense, the bracts purplish; calyx about 1 cm. long, the lobes acute.

6. **Salvia collinsii** Donn. Smith, Bot. Gaz. **61**: 386. 1916.

Type from Pantepec, Chiapas.

Shrub, 1 to 1.5 meters high; leaves lance-oblong, long-acuminate, obtuse or acute at base, serrate, green and glabrous above, pale beneath; calyx 7 to 8 mm. long, green, the lobes acute; corolla white.

7. **Salvia confinis** Fernald, Proc. Amer. Acad. **35**: 523. 1900.

Sonora. Type from Fort Huachuca, Arizona.

Branches stellate-canescent; leaves oblong, 1.5 to 4.5 cm. long, obtuse or acutish, canescent; racemes spikelike, 1 to 4 cm. long; corolla blue, scarcely 1 cm. long.

8. **Salvia californica** T. S. Brandeg. Proc. Calif. Acad. II. **2**: 197. 1889.

Baja California; type from Calmalli.

Shrub, 1 meter high or less, densely stellate-tomentose; leaves sessile, ovate-elliptic, 18 mm. long or less, with few coarse spreading teeth; racemes interrupted, spikelike; corolla blue .

9. **Salvia fasciculata** Fernald, Proc. Amer. Acad. **45**: 54. 1904.

Type from mountains near Oaxaca.

Shrub; leaves 1 to 2.5 cm. long, canescent beneath, strongly revolute; racemes 1 to 3 cm. long; calyx tubular-campanulate, in anthesis 4 mm. long, minutely stellate-pubescent; corolla purplish, 8 mm. long.

10. **Salvia coulteri** Fernald, Proc. Amer. Acad. **35**: 519. 1900.

Type from somewhere in Mexico.

Leaves 1 to 1.5 cm. long, stellate-tomentulose, obtuse, revolute; racemes 2 to 3 cm. long; calyx 6 to 7 mm. long, the teeth lance-subulate; corolla 12 mm. long.

11. **Salvia candicans** Mart. & Gal. Bull. Acad. Brux. 11^2: 61. 1844.

Puebla; type from Tehuacán.

Shrub, 2 meters high or less; leaves 1 to 3 cm. long, obtuse, coriaceous, very densely stellate-tomentose, at least beneath; racemes short, dense; calyx 5 to 8 mm. long, densely stellate-tomentose; corolla 8 to 13 mm. long.

12. **Salvia thymoides** Benth. Lab. Gen. & Sp. 255. 1834.

Puebla and Oaxaca; type from Mitla, Oaxaca.

Slender shrub, usually about 30 cm. high; leaves mostly 4 to 7 mm. long, obtuse, stellate-tomentulose or glabrate; racemes slender, elongate, interrupted; calyx 5 to 6 mm. long; corolla about 13 mm. long.

13. **Salvia chionophylla** Fernald, Proc. Amer. Acad. **43**: 64. 1907.

Type from Chojo Grande, 27 miles southeast of Saltillo, Coahuila.

Stems fruticose, decumbent, stellate-canescent; leaves 5 to 15 mm. long, rounded at apex, minutely stellate-tomentulose, whitish; racemes 5 to 10 mm. long, interrupted; calyx 6 to 9 mm. long; corolla 1.5 cm. long, blue and white.

14. **Salvia serpyllifolia** Fernald, Proc. Amer. Acad. **35**: 521. 1900.

Type from San Luis Potosí.

Stems short-pubescent with white, spreading or recurved hairs; racemes 10 to 20 cm. long, interrupted; calyx short-hispidulous; corolla 12 mm. long.

15. **Salvia coahuilensis** Fernald, Proc. Amer. Acad. **35**: 520. 1900.

Coahuila; type from Saltillo.

Plants 70 cm. high or less, woody below, the stems stellate-puberulent or glabrate; racemes 5 to 35 cm. long, interrupted; calyx puberulent, 6 to 8 mm. long; corolla 1.5 cm. long, blue.

16. **Salvia lycioides** A. Gray, Proc. Amer. Acad. **21**: 408. 1886.

Santa Eulalia Mountains of Chihuahua.

Slender shrub, the branches sparsely puberulent or glabrate; leaves mostly obtuse; racemes slender, elongate, interrupted; calyx 6 to 8 mm. long; corolla nearly 2 cm. long.

17. **Salvia ballotaeflora** Benth. Lab. Gen. & Sp. 270. 1834.

Salvia laxa Benth. Lab. Gen. & Sp. 270. 1834.

Salvia ballotaeflora eulaliae Fernald, Proc. Amer. Acad. **35**: 522. 1900.

Chihuahua to Zacatecas, Hidalgo, and Tamaulipas; type from Tolimán (Querétaro ?). Western Texas.

Low shrub; leaves broadly deltoid-ovate, 1 to 3 cm. long, obtuse, densely stellate-tomentose beneath, usually truncate at base but rarely subcordate; racemes short, few-flowered; calyx 5 to 9 mm. long, the lobes very obtuse; corolla about 12 mm. long. "Engorda-cabra" (Zacatecas); "crespa" (San Luis Potosí); "mejorana" (Texas, Chihuahua); "mejorana del país" (Chihuahua).

S. ballotaeflora eulaliae is a form with large leaves (3 cm. long).

18. **Salvia ramosa** T. S. Brandeg. Zoe **5**: 255. 1908.

Type from Tlacuilotepec, Puebla.

Shrub; leaves 1 cm. long or less, obtuse or rounded at apex, very rugose, finely stellate-puberulent, green above; racemes elongate, interrupted; calyx 4 to 5 mm. long; corolla about 7 mm. long.

19. **Salvia platycheila** A. Gray, Proc. Amer. Acad. **8**: 292. 1870.

Carmen Island, Baja California.

Shrub; leaves slender-petiolate, 2 to 4.5 cm. long, very obtuse, very minutely and densely tomentulose; racemes short or elongate, interrupted; calyx 8 to 12 mm. long, minutely tomentulose; corolla nearly 2 cm. long.

20. **Salvia similis** T. S. Brandeg. Zoe **5**: 108. 1901.

Baja California; type from mountains of the Cape Region.

Much-branched shrub, 1 to 3 meters high, the stems minutely canescent-tomentulose; leaves ovate, 2.5 to 7.5 cm. long, coarsely crenate-serrate, minutely stellate-tomentulose when young but soon glabrous; racemes short, dense; calyx 5 to 7 mm. long; corolla pale blue.

21. **Salvia cedrosensis** Greene, Bull. Calif. Acad. **1**: 212. 1885.

Baja California; type from Cedros Island.

Low shrub; leaves slender-petiolate, ovate or broadly ovate, 2.5 cm. long or less, obtuse or acute, crenate, sparsely stellate-pubescent in age; racemes short or elongate, interrupted; calyx 5 to 7 mm. long, violet.

22. **Salvia chamaedryoides** Cav. Icon. Pl. **2**: 77. *pl. 197*. 1793.

Salvia chamaedrifolia Andrews, Bot. Rep. **6**: *pl. 416*. 1805 (?).

Salvia chamaedrys Willd. Hort. Berol. **1**: 29. *pl. 29*. 1816.

Salvia chamaedryoides isochroma Fernald, Proc. Amer. Acad. **35**: 522. 1900.

Zacatecas and San Luis Potosí to Mexico.

Low shrub, usually about 40 cm. high; leaves 1 to 3.5 cm. long, obtuse, finely crenate, canescent-tomentose, sometimes green above; racemes elongate, interrupted; calyx 7 to 12 mm. long, often tinged with violet; corolla about 12 mm. long.

23. **Salvia purpusii** T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 187. 1911.

Type from Cerro del Zapatero, Coahuila.

Low shrub, the branches glandular-pubescent; leaves 1.5 to 3 cm. long, obtuse, coarsely crenate, the lower ones (oblong) sometimes cordate at base,

densely glandular-pubescent; racemes 3 to 6 cm. long; calyx about 1 cm. long; corolla 18 mm. long, violaceous.

24. **Salvia dasycalyx** Fernald, Proc. Amer. Acad. **45**: 421. 1910.

Type from the Sierra Madre of Michoacán or Guerrero, altitude 1,800 meters.

Shrub, 1.5 meters high; leaves lance-oblong, 3.5 to 5 cm. long, villosulous beneath along the veins; panicles dense, many-flowered; calyx 3 mm. long, villous; corolla violet, 7 to 8 mm. long.

25. **Salvia fallax** Fernald, Proc. Amer. Acad. **45**: 419. 1910.

Type from Tepic.

Shrub, the young branches villous; leaves ovate, 6 to 11 cm. long, sharply serrate, sparsely villous beneath; racemes 10 to 15 cm. long; calyx 5 to 6 mm. long, violaceous; corolla blue, 1 cm. long.

26. **Salvia rubropunctata** Robins. & Fern. Proc. Amer. Acad. **30**: 121. 1894.

Type from Huehuerachi, Sonora.

Plants suffrutescent; leaves ovate or oblong-ovate, 4 cm. long or less, stellate-pubescent beneath or glabrate, red-punctate, finely crenate; racemes short and dense; calyx 5 mm. long; corolla blue, 12 mm. long.

27. **Salvia fruticulosa** Benth. Lab. Gen. & Sp. 721. 1834.

Type collected near the city of Oaxaca.

Low shrub, the stems white-tomentose; leaves ovate, obtuse, crenulate, white-tomentose beneath.

28. **Salvia conzattii** Fernald, Proc. Amer. Acad. **35**: 526. 1900.

Type collected between El Parián and Etla, Oaxaca, altitude 370 meters.

Leaves 1.5 to 6 cm. long, rounded at apex, very rugose above, finely crenulate; racemes spikelike, 2 to 6 cm. long; calyx densely blue-tomentose; corolla blue, 12 mm. long.

29. **Salvia pruinosa** Fernald, Proc. Amer. Acad. **35**: 526. 1900.

Type collected between Mesquitec and Monte Escobedo, Jalisco.

Shrub, the branchlets stellate-tomentulose; leaves 2.5 to 5 cm. long, obtuse, crenate-dentate, green and rugose above, white-tomentulose beneath; racemes dense, 10 cm. long or less; calyx 4 to 5 mm. long; corolla blue, 12 mm. long.

30. **Salvia goldmanii** Fernald, Proc. Amer. Acad. **35**: 527. 1900.

Type from Batopilas, Chihuahua.

Stems thinly stellate-tomentulose; leaves 5 to 10 cm long, acute, green above, pale beneath; racemes 5 to 15 cm. long; calyx 5 to 6 mm. long, bluish; corolla 1.5 cm. long.

31. **Salvia scorodoniaefolia** Poir. Encycl. Suppl. **5**: 46. 1817.

Salvia melissodora Lag. Gen. & Sp. Nov. 2. 1817.

Salvia scorodonia Benth. Lab. Gen. & Sp. 264. 1834.

Salvia scorodoniaefolia crenaea Fernald, Proc. Amer. Acad. **35**: 524. 1900.

Chihuahua to Oaxaca and Puebla.

Shrub, 1 to 1.5 meters high; leaves mostly deltoid-ovate, 2 to 9 cm. long, obtuse, crenate, whitish-tomentose beneath, usually green above; racemes short or elongate, mostly dense; calyx 5 to 7 mm. long; corolla blue.

32. **Salvia dugesii** Fernald, Proc. Amer. Acad. **36**: 500. 1901.

Guanajuato, Querétaro, and Mexico; type from Guanajuato.

Shrub; leaves 1.5 to 4.5 cm. long, obtuse, very rugose, crenate, whitish-tomentose beneath, usually green above; racemes dense, elongate; calyx 7 mm. long, violaceous; corolla 1.5 cm. long. "Chía cimarrona" (Guanajuato).

33. Salvia lasiantha Benth. Lab. Gen. & Sp. 276. 1834.
?*Salvia keerlii* Benth. Lab. Gen. & Sp. 263. 1834.
Durango to San Luis Potosí and Oaxaca.
Shrub, 1 to 2.5 meters high; leaves mostly ovate-deltoid, 2 to 4.5 cm. long, obtuse, crenulate, whitish-tomentose beneath, usually green above; racemes dense, elongate; calyx 5 to 7 mm. long, bluish or purplish; corolla about 12 mm. long.

34. Salvia semiatrata Zucc. Abh. Akad. Wiss. München 1: 298. 1829–30.
Oaxaca.
Shrub, 1 to 2 meters high; leaves ovate-deltoid, 1.5 to 3.5 cm. long, obtuse, crenulate, whitish-tomentose beneath, green and very rugose above; racemes lax; corolla about 2 cm. long, the lower lip nearly black.

35. Salvia rupicola Fernald, Proc. Amer. Acad. 45: 420. 1910.
Type from Ixmiquilpan, Hidalgo.
Shrub; leaves 1 to 2 cm. long, obtuse, glandular-pilose beneath, green and rugose above, crenate; racemes 5 to 9 cm. long; corolla 1 cm. long.

36. Salvia gonzalezii Fernald, Proc. Amer. Acad. 35: 524. 1900.
Type collected between El Parián and Etla, Oaxaca, altitude 370 meters.
Stems villous and glandular-puberulent; leaves broadly ovate, 1 to 2.5 cm. long, obtuse, crenulate, white-villous beneath; racemes 5 to 15 cm. long; corolla deep blue, 1.5 cm. long.

37. Salvia thyrsiflora Benth. Bot. Voy. Sulph. 151. 1844.
Tepic to Michoacán; type from Tepic.
Shrub, 1 to 2 meters high; leaves ovate-lanceolate, short-petiolate, 2 to 5 cm. long, crenate, tomentose beneath, green above; calyx 4 to 5 mm. long; corolla about 1.5 cm. long.

38. Salvia multiramea Fernald, Proc. Amer. Acad. 35: 525. 1900.
Guerrero to Chiapas; type collected near the city of Oaxaca.
Plants about 1 meter high, suffrutescent; leaves 2 to 7 cm. long, crenulate, tomentose beneath, short-petiolate; corolla blue or white, 10 to 12 mm. long.

39. Salvia alamosana Rose, Contr. U. S. Nat. Herb. 1: 110. 1890.
Type from Sierra de Alamos, Sonora.
Plants about a meter high, herbaceous or suffrutescent; leaves 5 to 7.5 cm. long, crenate, tomentose beneath; corolla blue, 1 cm. long.

40. Salvia chapalensis Briq. Ann. Cons. Jard. Genève 2: 145. 1898.
Type from Lake Chapala, Jalisco.
Leaves ovate, 4 to 5 cm. long, crenate, green above, white-tomentose beneath; corolla blue, about 1.5 cm. long.

41. Salvia aspera Mart. & Gal. Bull. Acad. Brux 11^2: 71. 1844.
Puebla and Oaxaca; type from mountains of Oaxaca.
Shrub, 1.5 meters high or less; leaves deltoid or deltoid-ovate, 1.5 to 2.5 cm. long, obtuse, truncate or subcordate at base, crenate, green and rugose above, tomentose beneath; calyx 2 cm. long; corolla 4 cm. long.

42. Salvia chrysantha Mart. & Gal. Bull. Acad. Brux. 11^2: 72. 1844.
Guerrero to Chiapas and Puebla; type from Cordillera of Oaxaca. Reported from Costa Rica.
Shrub, 1 to 3 meters high; leaves oblong-ovate to broadly ovate, 3 to 7 cm. long, obtuse or acute, rounded at base, crenulate, green above, densely tomentose beneath; racemes dense or interrupted, covered with beautiful yellow wool; calyx about 1 cm. long; corolla 2 to 3 cm. long, yellow, red within.

43. Salvia adglutinans Lag. Gen. & Sp. Nov. 2. 1816.

Described from "Nova Hispania," the type collected by Sessé and Mociño.

Leaves ovate-lanceolate, cordate at base, acute, serrate, viscid-villous beneath when young; corolla scarlet, pubescent, 4 times as long as the calyx.

44. Salvia sessei Benth. Lab. Gen. & Sp. 288. 1834.

Rhodochlamys speciosa Schauer, Linnaea **30**: 707. 1847.

Salvia roezli Scheidw. Fl. Serr. Jard. **14**: 31. *pl. 1407*. 1861.

Salvia semperflorens Llave, Naturaleza **7**: Apend. 81. 1885.

Salvia fastuosa Sessé & Moc. Pl. Nov. Hisp. 7. 1887.

Morelos and Guerrero.

Shrub, 2.5 to 4.5 meters high; leaves 5 to 13 cm. long, long-acuminate, crenate-serrate or subentire, yellow-glandular beneath; racemes lax, paniculate; calyx 2.5 cm. long, bright red; corolla scarlet, about 5 cm. long.

45. Salvia regla Cav. Icon. Pl. **5**: 33. *pl. 455*. 1799.

Salvia deltoidea Pers. Syn. Pl. **1**: 28. 1817.

Salvia crenata Mart. & Gal. Bull. Acad. Brux. **11²**: 74. 1844.

Coahuila and Durango to Oaxaca and Hidalgo; type from Regla, Hidalgo.

Shrub, 1 to 2 meters high; leaves obtuse, coarsely crenate, green; flowers axillary or in short racemes; calyx 1.5 to 2 cm. long, bright red; corolla scarlet, 4 to 5 cm. long.

46. Salvia pubescens Benth. Lab. Gen. & Sp. 723. 1834.

Oaxaca; type from San Dionisio.

Shrub or small tree, 1 to 6 meters high; leaves 4.5 to 10 cm. long, acute or acuminate, crenate, green; flowers axillary or in short racemes; calyx red, 1.5 cm. long; corolla scarlet, 4 to 5 cm. long.

47. Salvia muralis Fernald, Proc. Amer. Acad. **43**: 65. 1907.

Iguala Canyon, Guerrero, altitude about 800 meters.

Shrub, 1 to 3 meters high; leaves slender-petiolate, 6 to 10 cm. long, acuminate, coarsely crenate, green; racemes short, the flowers mostly geminate; calyx 1.5 to 2 cm. long, green or reddish; corolla scarlet, 4.5 to 6 cm. long.

48. Salvia disjuncta Fernald, Proc. Amer. Acad. **35**: 533. 1900.

Chiapas.

Leaves deltoid-ovate, obtuse to acuminate, crenulate, green, somewhat tomentose beneath; calyx in anthesis 12 to 15 mm. long; corolla 3 to 4 cm. long.

49. Salvia greggii A. Gray, Proc. Amer. Acad. **8**: 369. 1870.

Coahuila and Durango; type from Saltillo, Coahuila.

Low shrub; leaves mostly 1 to 1.5 cm. long, obtuse, usually entire and glabrous; calyx 10 to 12 mm. long, purplish; corolla red, 2.5 to 3 cm. long.

50. Salvia oaxacana Fernald, Proc. Amer. Acad. **35**: 536. 1900.

Type from La Joya Canyon, Oaxaca, altitude 1,380 meters.

Shrub, much branched; leaves ovate, 1 cm. long or less, truncate or cordate at base, crenate, rugose above, white-tomentose beneath; calyx 8 to 10 mm. long, glandular-pilose.

51. Salvia oresbia Fernald, Proc. Amer. Acad. **35**: 536. 1900.

San Luis Potosí; type from San Rafael.

Plants suffrutescent, about 30 cm. high, the branches glabrate; leaves ovate to rounded-ovate, 1 to 3 cm. long, obtuse or acute, appressed-serrate, glabrate; calyx purplish, 10 to 14 mm. long; corolla slightly over 2 cm. long.

52. **Salvia grahami** Benth. in Lindl. Bot. Reg. **16**: *pl. 1370*. 1830.

Chihuahua and Coahuila to San Luis Potosí, Puebla, and Michoacán; type from Tlapujahua.

Low shrub; leaves petiolate, narrowly or broadly ovate, mostly 1 to 3 cm. long, obtuse or acute, crenate or subentire, green; racemes short or elongate, interrupted; calyx 7 to 12 mm. long, green or purplish; corolla red, 22 to 28 mm. long.

53. **Salvia microphylla** H. B. K. Nov. Gen. & Sp. **2**: 295. 1817.

Salvia microphylla canescens A. Gray, Proc. Amer. Acad. **21**: 407. 1886.
Salvia microphylla wislizeni A. Gray, Proc. Amer. Acad. **21**: 408. 1886.

Chihuahua to San Luis Potosí, Puebla, and Mexico; type from Santa Rosa, Guanajuato.

Low shrub; leaves petiolate, obtuse or acute, crenate or subentire, densely or sparsely pubescent beneath; calyx 7 to 12 mm. long, green or bluish; corolla red, 2 to 2.5 cm. long. "Mirto" (Puebla, Jalisco); "pabellón mexicano"; "salvia del monte" (*Ramírez*); "toronjil" (Guerrero); "bandera mexicana" (Oaxaca, *Reko*).

54. **Salvia schaffneri** Fernald, Proc. Amer. Acad. **35**: 535. 1900.

Type from mountains near Morales, San Luis Potosí.

Branches glandular-puberulent; leaves deltoid-ovate, acuminate, crenulate, puberulent, petiolate; racemes 15 cm. long or less; calyx 10 to 12 mm. long. "Mirto grande."

55. **Salvia lemmoni** A. Gray, Proc. Amer. Acad. **20**; 309. 1885.

Chihuahua and Sonora. Arizona; type from Huachuca Mountains.

Plants suffrutescent, 30 to 60 cm. high, puberulent; leaves ovate or deltoid-ovate, crenulate, green, slender-petiolate; calyx 8 to 10 mm. long, glandular-puberulent.

56. **Salvia neurepia** Fernald, Proc. Amer. Acad. **35**: 535. 1900.

San Luis Potosí and Mexico; type from Morales, San Luis Potosí.

Plants suffrutescent, the branches puberulent or villous; leaves ovate or rounded-ovate, rounded to subcordate at base, crenate, pubescent; racemes short or elongate; calyx 10 to 13 mm. long. "Mirto" (San Luis Potosí).

A decoction of the plant is a local remedy for fevers and headache.

57. **Salvia pringlei** Robins. & Greenm. Proc. Amer. Acad. **29**: 391. 1894.

Type from Tequila, Jalisco.

Shrub, 1 to 2 meters high, the branches glabrate; leaves ovate, 4 to 9.5 cm. long, acuminate, obtuse or rounded at base, serrate, slender-petiolate; racemes dense; calyx 1.5 cm. long; corolla rose-purple, 3.5 to 4 cm. long, villous.

58. **Salvia involucrata** Cav. Icon. Pl. **2**: 3. *pl. 105*. 1793.

Salvia laevigata H. B. K. Nov. Gen. & Sp. **2**: 295. *pl. 147*. 1817.

Mexico, Hidalgo, and Puebla. Guatemala.

Plants suffrutescent; leaves ovate or oblong-ovate, 6 to 12 cm. long, acuminate, crenate-serrate, paler beneath; racemes dense, elongate; calyx about 1.5 cm. long, red or purplish.

59. **Salvia pulchella** DC. Cat. Hort. Monsp. 142. 1813.

Chiapas. Guatemala.

Plants large, herbaceous or suffrutescent; leaves broadly ovate, 8 cm. long or less, acuminate, crenate, paler beneath; racemes elongate; calyx green; corolla red, about 3 cm. long.

60. Salvia adenophora Fernald, Proc. Amer. Acad. **35**: 538. 1900.

Oaxaca; type from Jayacatlán.

Shrub, the branches glandular-pilose; leaves cordate-ovate, 4 to 10 cm. long, obtuse or acute, crenate-serrate, tomentose beneath; racemes 30 cm. long or less; calyx 8 to 10 mm. long in anthesis; corolla red.

61. Salvia fulgens Cav. Icon. Pl. **1**: 15. *pl. 23*. 1791.

Salvia cardinalis H. B. K. Nov. Gen. & Sp. **2**: 300. *pl. 152*. 1817.

Salvia boucheana Kunth, Ind. Sem. Hort. Berol. 1845.

Salvia grandiflora Sessé & Moc. Pl. Nov. Hisp. 7. 1887.

Zacatecas to Michoacán and Puebla.

Plants 1 to 3 meters high, herbaceous or suffrutescent; leaves ovate, 5 to 12 cm. long, acuminate, cordate or rounded at base; racemes short or elongate; corolla red.

62. Salvia orizabensis Fernald, Proc. Amer. Acad. **35**: 538. 1900.

Type from Mount Orizaba.

Stems short-pilose, glandular above; leaves ovate, 4 to 8 cm. long, subcordate at base; calyx 15 to 17 mm. long in anthesis.

63. Salvia chiapensis Fernald, Proc. Amer. Acad. **35**: 544. 1900.

Chiapas.

Plants herbaceous or suffrutescent, the stems puberulent below, villosulous above; leaves ovate or oblong-ovate, 5 to 12 cm. long, acute, serrate, canescent-tomentose beneath; calyx 7 to 8 mm. long in anthesis.

64. Salvia antennifera Briq. Ann. Cons. Jard. Genève **2**: 168. 1894.

Type from Chiapas.

Shrub, the stems villous; leaves 10 to 14 cm. long, acuminate, sparsely pilose, serrate; calyx about 8 mm. long, glandular-pilose.

65. Salvia curviflora Benth. Lab. Gen. & Sp. 284. 1834.

Michoacán and Hidalgo; type from Tlalpujahua, Michoacán.

Plants fruticose, the branches tomentose; leaves ovate-oblong, acute, crenate-serrate, tomentose beneath.

66. Salvia miniata Fernald, Proc. Amer. Acad. **35**: 545. 1900.

Chiapas.

Glabrate shrub; leaves oblong-lanceolate, 15 to 20 cm. long, sharply serrate; corolla 3 to 3.2 cm. long, red.

67. Salvia aristulata Mart. & Gal. Bull. Acad. Brux. **11²**: 67. 1844.

Salvia longistyla Benth. Lab. Gen. & Sp. 295. 1834.

Jalisco to Oaxaca and Veracruz; type from Capulalpan, Oaxaca.

Plants suffrutescent, 1 to 3 meters high; leaves long-petiolate, rounded-ovate, 7 to 18 cm. long, acute or acuminate, crenate, thin, green; racemes elongate, lax; calyx 2 to 2.5 cm. long; corolla 3.5 to 4.5 cm. long, curved.

68. Salvia cyclophylla Fernald, Proc. Amer. Acad. **35**: 551. 1900.

Type collected between Tlapancingo, Oaxaca, and Tlalixtaquilla, Guerrero.

Shrub; leaves rounded-cordate, 6 to 7 cm. long, rounded at apex, crenate, thin, sparsely short-pilose; calyx glandular-pilose; corolla 25 to 27 mm. long.

69. Salvia incana Mart. & Gal. Bull. Acad. Brux. **11²**: 68. 1844.

Type from Tehuacán, Puebla.

Plants suffrutescent, canescent-hirsute; leaves cordate-ovate, 2.5 cm. long, acutish, crenate, whitish-tomentose beneath; racemes short; corolla 3.5 cm. long.

70. Salvia perlonga Fernald, Proc. Amer. Acad. 35: 546. 1900.

Type from the Sierra Madre near Chilpancingo, Guerrero.

Shrub, the branches hispid-pilose; leaves acuminate, crenate, green and rugose above, whitish-tomentose beneath; racemes 10 to 20 cm. long; calyx purplish, 13 mm. long; corolla 3 cm. long, red.

71. Salvia graciliflora Mart. & Gal. Bull. Acad. Brux. 11^2: 75. 1844.

Type from Zacuapan, Veracruz.

Stems suffrutescent; leaves ovate, 5 cm. long, acuminate, serrate; racemes short; calyx canescent-tomentose; corolla about 2.5 cm. long.

72. Salvia purpurea Cav. Icon. Pl. 2: 52. *pl. 166.* 1793.

Salvia affinis Schlecht. & Cham. Linnaea 5: 99. 1830.

Salvia purpurea pubens A. Gray, Proc. Amer. Acad. 22: 446. 1887.

Durango and Jalisco to Chiapas and Veracruz. Central America.

Plants herbaceous or suffrutescent, 1 to 3 meters high, the stems usually minutely puberulent or glabrate; leaves ovate or broadly ovate, 5 to 10 cm. long, acuminate, serrate; racemes dense, short or elongate; calyx usually purple-tomentose. "Chichinguaste" (Guatemala).

73. Salvia littae Visiana, Padov. Nuov. Sagg. 6: 87. 1847.

Oaxaca.

Stems chiefly herbaceous, 1 to 1.5 meters high; leaves ovate or rounded-ovate, 5 to 9 cm. long, acute, crenate-serrate; racemes dense; corolla purplish-villous.

74. Salvia rosei Fernald, Proc. Amer. Acad. 35: 548. 1900.

Type collected between Colotlán and Bolaños, Jalisco.

Shrub; leaves ovate, 3.5 to 6 cm. long, obtuse or acute, crenate-serrate; racemes 10 cm. long or less; calyx puberulent; corolla 2.5 to 3 cm. long.

75. Salvia arbuscula Fernald, Proc. Amer. Acad. 45: 421. 1910.

Type from the Sierra Madre of Michoacán or Guerrero, altitude 1,500 meters.

Shrub, 2.5 meters high, the branches lanate; leaves ovate, about 10 cm. long, acuminate, subcordate at base, white-tomentose beneath; racemes elongate; corolla 2.5 to 3 cm. long.

76. Salvia iodantha Fernald, Proc. Amer. Acad. 35: 547. 1900.

Type from Cuernavaca, Morelos, altitude 2,340 meters.

Plants herbaceous or suffrutescent, 1 to 1.5 meters high, the stems puberulent; leaves 7 cm. long or less, short-acuminate, serrate; racemes 10 to 20 cm. long, subsecund; calyx in anthesis 5 mm. long; corolla slightly more than 2 cm. long.

77. Salvia michoacana Fernald, Proc. Amer. Acad. 35: 548. 1900.

Jalisco and Michoacán; type from Pátzcuaro, Michoacán.

Shrub, 1 to 3 meters high, the branches puberulent; leaves 5 to 12 cm. long, acuminate, crenate or serrate; racemes dense, 5 to 15 cm. long; calyx 4 to 5 mm. long; corolla 2 to 2.5 cm. long.

78. Salvia nervata Mart. & Gal. Bull. Acad. Brux. 11^2: 77. 1844.

Type from Sierra de San Felipe, Oaxaca. Guatemala.

Plants herbaceous or suffrutescent, the stems puberulent; leaves ovate or ovate-lanceolate, 5 to 8 cm. long, acuminate; racemes secund, lax; calyx 10 to 14 mm. long; corolla about 3.5 cm. long.

79. Salvia karwinskii Benth. Lab. Gen. & Sp. 725. 1834.

Type from somewhere in Mexico.

Stems lanate; leaves ovate, acuminate, rounded at base, lanate beneath; calyx glandular-villous.

80. Salvia cinnabarina Mart. & Gal. Bull. Acad. Brux. **11²**: 63. 1844.

Oaxaca and Chiapas; type from Cerro de San Felipe, Oaxaca. Guatemala.

Plants herbaceous or suffrutescent; leaves ovate, 3 to 12 cm. long, acute or acuminate, obtuse or rounded at base, serrulate, thinly tomentose or glabrate beneath; racemes elongate; corolla bright red, about 3 cm. long.

81. Salvia elegans Vahl, Enum. Pl. **1**: 238. 1804.

Salvia incarnata Cav. Anal. Cienc. Nat. **2**: 112. 1800. Not *S. incarnata* Etling. 1777.

Salvia punicea Mart. & Gal. Bull. Acad. Brux. **11²**: 65. 1844.

Salvia microcalyx Scheele, Linnaea **22**: 589. 1849.

Salvia longiflora Sessé & Moc. Pl. Nov. Hisp. 8. 1887.

Salvia elegans sonorensis Fernald, Proc. Amer. Acad. **35**: 550. 1900.

Sonora and Chihuahua to Veracruz and Oaxaca.

Plants fruticose or herbaceous; leaves chiefly ovate, 3 to 10 cm. long, obtuse to acuminate, serrate or crenate, pubescent or glabrate beneath; racemes lax, elongate; corolla bright red, 3 to 3.5 cm. long.

82. Salvia mollissima Mart. & Gal. Bull. Acad. Brux. **11²**: 71. 1844.

Type from Oaxaca.

Stems chiefly herbaceous, hirsute; leaves ovate-lanceolate, 7.5 cm. long, acuminate, crenate, white-tomentose beneath; calyx 8 to 10 mm. long; corolla 2.5 cm. long.

83. Salvia coccinea Juss.; Murr. Comm. Gött. **1**: 86. *pl. 1.* 1778.

Salvia pseudococcinea Jacq. Coll. Bot. **2**: 302. 1788.

Salvia ciliata Benth. Lab. Gen & Sp. 286. 1834.

Salvia galeottii Mart.; Mart. & Gal. Bull. Acad. Brux. **11²**: 75. 1844.

Salvia coccinea pseudococcinea Kuntze, Rev. Gen. Pl. **2**: 530. 1891.

Tamaulipas and Nuevo León to Tepic, Chiapas, and Yucatán. Widely distributed in tropical America.

Stems usually herbaceous but sometimes suffrutescent, commonly hirsute; leaves ovate or deltoid, 1.5 to 5 cm. long, obtuse or acute, crenate, tomentose or pubescent beneath; racemes short or elongate; calyx 6 to 9 mm. long; corolla about 2.5 cm. long, bright red. "Mirto" (Nuevo León).

This species is commonly cultivated as an ornamental plant under the names "salvia" and "scarlet sage." Several horticultural forms are known.

3. CUNILA L. Syst. Nat. ed. 10. 1359. 1759.

Low shrubs or herbs; leaves serrate or entire; flowers small, in dense or loose clusters, these axillary or in terminal spikes; calyx tubular, 10 to 13-nerved, barbate in the throat, the 5 teeth subequal; corolla bilabiate; stamens 2.

Bractlets equaling the calyx; flowers sessile or nearly so, in dense spikes.
1. C. lythrifolia.

Bractlets much shorter than the calyx; flowers pedicellate.

Corolla more than twice as long as the calyx, usually 3 times as long.
2. C. longiflora.

Corolla less than twice as long as the calyx.

Flower clusters arranged in rounded cymes—**3. C. pycnantha.**

Flower clusters spicate.

Leaves densely tomentose beneath—**4. C. tomentosa.**

Leaves thinly villous or glabrate beneath.

Stems villosulous—**5. C. polyantha.**

Stems glabrous—**6. C. leucantha.**

1. **Cunila lythrifolia** Benth. in Edwards, Bot. Reg. 15: *pl. 1289.* 1829.
?Cunila stachyoides Mart. & Gal. Bull. Acad. Brux. 11[2]: 190. 1844.
Hidalgo, Mexico, and Morelos.

Plants 0.6 to 2 meters high, herbaceous or suffrutescent, the stems densely pilose; leaves lance-oblong or oblong-ovate, 4 to 8 cm. long, acuminate, serrulate, tomentulose beneath; spikes very dense, villous; corolla purplish.

Cunila stachyoides was described from Orizaba.

2. **Cunila longiflora** A. Gray, Proc. Amer. Acad. 22: 444. 1887.
Jalisco; type from Río Blanco.

Plants slender, suffrutescent; leaves lanceolate to ovate, 3 to 6.5 cm. long, long-acuminate, serrulate or entire, thinly tomentulose beneath; flowers in lax pedunculate cymes; corolla 6 to 8 mm. long.

The writer has seen no specimens of *C. secunda* S. Wats.,[1] which was described from Guanajuato, where it is said to be known as "poleo de cerro." From the description it can not be distinguished from *C. longiflora*, and probably Watson's name should replace *C. longiflora.*

3. **Cunila pycnantha** Robins. & Greenm. Proc. Amer. Acad. 29: 391. 1894.
Jalisco, Michoacán, and Morelos; type from Nevado de Colima, altitude 2,100 meters.

Slender shrub, 1 to 2 meters high; leaves short-petiolate, oblong-lanceolate to ovate, 2.5 to 5.5 cm. long, long-acuminate, serrulate or entire, nearly glabrous; corolla white, 5 mm. long.

4. **Cunila tomentosa** Fernald, Proc. Amer. Acad. 35: 565. 1900.
Type collected between Plunia and San Miguel Suchistepec, Oaxaca, altitude 1,800 meters.

Stems sharply quadrangular; leaves lanceolate or ovate-lanceolate, 2 to 5 cm. long, acuminate, entire or serrulate; corolla 3 mm. long.

5. **Cunila polyantha** Benth. Lab. Gen. & Sp. 362. 1834.
Veracruz, Oaxaca, and Guerrero. Guatemala.

Leaves narrowly lanceolate to broadly ovate, 2 to 5 cm. long, acute to long-acuminate, entire or serrulate, thinly tomentose or glabrate beneath; corolla white, about 4 mm. long.

6. **Cunila leucantha** Benth. Lab. Gen. & Sp. 361. 1834.
Described from Mexico.

Leaves ovate-oblong, 12 to 16 mm. long, entire, glabrous; cymes lax, 16 to 20-flowered, the pedicels pubescent; corolla white.

The writer has seen no specimens agreeing with the original description.

4. POLIOMINTHA A. Gray, Proc. Amer. Acad. 8: 295. 1870.

Low shrubs; leaves entire; flowers pink or purple, clustered in the leaf axils; calyx tubular, 13 to 15-striate, barbate in the throat, the 5 teeth equal or nearly so; corolla bilabiate, the upper lip erect, emarginate, the lower 3-cleft, the tube equaling or longer than the calyx; stamens 2.

The following species are the only ones known.

Flowers 2 to 3.5 cm. long.
Leaves oval to broadly ovate----------1. P. longiflora.
Leaves linear-oblong----------2. P. bicolor.

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[1] Proc. Amer. Acad. 18: 136. 1883.

Flowers less than 1.5 cm. long.
Leaves linear; calyx villous-hirsute_____3. P. incana.
Leaves oblong to suborbicular; calyx tomentulose.
Leaves glabrate, the pubescence simple_____4. P. glabrescens.
Leaves densely stellate-tomentose.
Leaves orbicular-ovate; corolla tube short-exserted_____5. P. marifolia.
Leaves oblong-ovate; corolla tube long-exserted_____6. P. mollis.

1. **Poliomintha longiflora** A. Gray, Proc. Amer. Acad. 8: 296. 1870.
Coahuila.
Shrub, about 30 cm. high; leaves 5 to 10 mm. long, rounded or obtuse at apex, canescent-tomentulose beneath with simple hairs, green above; corolla 2.5 to 3.5 cm. long, red. "Orégano."
The leaves are used for flavoring food and for making a beverage like tea.

2. **Poliomintha bicolor** S. Wats. Proc. Amer. Acad. 25: 160. 1890.
Hedeoma bicolor Briq. Ann. Cons. Jard. Bot. Genève 2: 185. 1898.
Type from Sierra de la Silla, Nuevo León, altitude 1,500 meters.
Densely branched shrub, 30 cm. high or less; leaves 4 to 8 mm. long, obtuse, densely white-tomentulose beneath with simple hairs, glabrous above; corolla about 3 cm. long.

3. **Poliomintha incana** (Torr.) A. Gray, Proc. Amer. Acad. 8: 296. 1870.
Hedeoma incana Torr. U. S. & Mex. Bound. Bot. 130. 1859.
Chihuahua and Sonora. Western Texas to Arizona and Utah.
Shrub, 1 meter high or less; leaves 1 to 3 cm. long, densely whitish-tomentulose with simple hairs; corolla 10 to 12 mm. long, pale purplish.
The Hopi Indians of Arizona boil and eat the leaves and use the flowers for seasoning food.

4. **Poliomintha glabrescens** A. Gray; Hemsl. Biol. Centr. Amer. Bot. 2: 549. 1882.
Type from Soledad, southwest of Monclova, Coahuila. Western Texas.
Low glabrate shrub; leaves oblong, 7 to 18 mm. long, obtuse, conspicuously punctate; corolla about 12 mm. long.

5. **Poliomintha marifolia** (Schauer) A. Gray, Proc. Amer. Acad. 8: 365. 1870.
Keithia marifolia Schauer, Linnaea 20: 705. 1847.
San Luis Potosí and Hidalgo; type from Zimapán, Hidalgo.
Leaves petiolate, 5 to 15 mm. long, rounded or very obtuse at apex, white-tomentulose; corolla 12 to 14 mm. long.

6. **Poliomintha mollis** (Torr.) A. Gray, Proc. Amer. Acad. 8: 365. 1870.
Hedeoma mollis Torr. U. S. & Mex. Bound. Bot. 129. 1859.
Western Texas; type collected along the Rio Grande at Puerto de Paisano; doubtless extending into Mexico.
Leaves 1 to 2.5 cm. long, obtuse or acutish, petiolate; corolla 12 mm. long.

6. SALAZARIA Torr. U. S. & Mex. Bound. Bot. 133. 1859.

The genus was named for Don José Salazar, Mexican Commissioner of the United States and Mexican Boundary Survey. It consists of a single species.

1. **Salazaria mexicana** Torr. U. S. & Mex. Bound. Bot. 133. *pl. 39.* 1859.
Baja California, Chihuahua, and Coahuila; type collected in Chihuahua below Presidio del Norte. Utah to southern California.

Slender shrub, 1 meter high or less, the branches densely white-tomentose; leaves remote, short-petiolate, oblong to ovate, 2 cm. long or less, obtuse, entire or nearly so; flowers in few-flowered racemes; calyx subglobose, in fruit inflated and bladderlike, 1.5 cm. long, purplish, reticulate-veined; corolla about 2 cm. long, purplish; stamens 4.

7. OCIMUM L. Sp. Pl. 597. 1753.

Herbs or low shrubs; leaves petiolate, toothed; flowers in verticillate racemes; calyx deflexed in fruit, campanulate or ovoid, 5-lobate, the lobes unequal; corolla white or nearly so, the tube usually shorter than the calyx; stamens 4.

Calyx hirtellous or puberulent, the upper lobe decurrent nearly or quite to the base of the tube----------1. **O. micranthum.**
Calyx glabrous, the upper lobe decurrent to the middle of the tube or less.
2. O. sellowii.

1. Ocimum micranthum Willd. Enum. Pl. 630. 1809.

Sinaloa to Tamaulipas, Yucatán, and Colima. West Indies; Central and South America.

Plants essentially annual but sometimes suffrutescent, 60 cm. high or less; leaves oblong-ovate to broadly ovate, 2 to 9 cm. long, acute or obtuse, serrate or subentire, puberulent or glabrate; racemes 2 to 10 cm. long; calyx 6 to 7 mm. long in fruit; corolla 4 mm. long. "Albahaca cimarrona" (Porto Rico); "albahaca silvestre" (Guatemala); "albahaca," "albahaca montés" (El Salvador).

Ocimum campechianum Mill.,[1] described from Campeche, is probably not essentially different. It is said by Bentham to be more pubescent than *O. micranthum*. Specimens from the Yucatán Peninsula seen by the writer do not differ from the usual forms of *O. micranthum*.

In El Salvador bunches of the leaves of this plant are put in the ears as a remedy for earache.

2. Ocimum sellowii Benth. Lab. & Gen. Sp. 6. 1834.

San Luis Potosí and Veracruz. Brazil.

Plants herbaceous or suffrutescent, glabrous throughout or nearly so; leaves ovate or lance-ovate, 4 to 8 cm. long, acute or acuminate, acute at base, coarsely serrate; racemes 10 to 20 cm. long; calyx in fruit 8 mm. long; corolla 4 mm. long.

8. TRICHOSTEMA L. Sp. Pl. 598. 1753.

Herbs or low shrubs; leaves entire; flowers in axillary clusters or in thyrsiform panicles; calyx 5-dentate, 10-nerved, the limb equal or oblique; corolla tube slender, the limb subequally 5-lobate; stamens 4, the anterior ones longer.

Leaves linear; corolla tube short-exserted----------1. **T. parishii.**
Leaves ovate or broadly elliptic; corolla tube not exserted--2. **T. arizonicum.**

1. Trichostema parishii Vasey, Bot. Gaz. 6: 173. 1880.

Trichostema lanatum denudatum A. Gray, Syn. Fl. ed. 2. 2[1]: 459. 1886.

Northern Baja California. Southern California; type from San Diego County.

Low shrub; leaves 1 to 4.5 cm. long, sessile, glabrate above, tomentulose beneath, the margins revolute; inflorescence thyrsiform, nearly naked, covered with purple wool; corolla about 1 cm. long; stamens long-exserted.

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[1] Gard. Dict. ed. 8. *Ocimum* no. 5. 1768.

2. Trichostema arizonicum A. Gray, Proc. Amer. Acad. 8: 371. 1872.

Northeastern Sonora. Arizona and New Mexico; type from Chiricahua Mountains, Arizona.

Plants 60 cm. high or less, woody below, puberulent; leaves petiolate, 1 to 2 cm. long, obtuse; flower clusters axillary, on long slender peduncles; corolla blue or whitish, 1 cm. long.

9. CLINOPODIUM L. Sp. Pl. 587. 1753.

Small shrubs or herbs; leaves entire or dentate; flowers axillary; calyx tubular, 13-nerved, bilabiate, the posterior lip 3-dentate, the anterior one 2-parted; corolla tube usually exserted, the limb bilabiate; stamens 4.

One herbaceous species occurs in Baja California.

Leaves 1 to 1.5 cm. long; petioles about as long as the blades.
1. C. oaxacanum.

Leaves mostly 3 to 7 cm. long; petioles much less than half as long as the blades.
Branches villous-hirsute.....2. C. macrostemum
Branches finely puberulent or glabrous.....3. C. laevigatum.

1. Clinopodium oaxacanum (Fernald) Standl.

Calamintha oaxacana Fernald, Proc. Amer. Acad. 35: 564. 1900.

Type collected between El Parián and Etla, Oaxaca, altitude 1,200 meters.

Shrub with slender glabrate branches; leaves elliptic-ovate, acute, sharply serrate; flowers solitary in the leaf axils; corolla red, about 3 cm. long.

2. Clinopodium macrostemum (Benth.) Kuntze, Rev. Gen. Pl. 2: 515. 1891.

Calamintha macrostema Benth. in DC. Prodr. 12: 229. 1848.

Mexico and Morelos, and perhaps in neighboring States.

Shrub, sometimes 2.5 meters high; leaves ovate or oblong-ovate, acuminate, serrate, sparsely villous-hirsute beneath; corolla about 3 cm. long. "Tabaquillo," "té del monte" (Mexico).

A decoction of the plant is employed as a remedy for affections of the stomach and intestines. The leaves are employed as a substitute for Chinese tea.

3. Clinopodium laevigatum Standl., sp. nov.

Sinaloa to Oaxaca; type from Cerro San Felipe, Oaxaca (*Nelson* 1117; U. S. Nat. Herb. no 565856).

Shrub, 0.5 to 1.5 meters high, the branchlets minutely puberulent or glabrate, barbate at the nodes; leaves short-petiolate, lance-oblong to ovate-oblong, 2 to 8 cm. long, acute or acuminate, obtuse or acute at base, serrate or subentire, usually glabrous but sometimes sparsely scabrous above and hirtellous beneath along the costa; flowers in few-flowered axillary pedunculate cymes; calyx about 9 mm. long, glabrous; corolla about 2.5 cm. long. "Poleo" (Sinaloa); "nurite," "té nurite" (Michoacán); "guie-zaa" (Oaxaca, Zapotec, *Reko*); "hierba del borracho" (Oaxaca); "té del monte" (Oaxaca, Michoacán).

Tea made from the leaves, sweetened with sugar, is a popular beverage in some places along the western coast of Mexico. It is considered a remedy for kidney troubles and a good tonic after malarial and other fevers.

10. HYPTIS Jacq. Coll. Bot. 1: 101. 1786.

Shrubs or herbs; leaves usually toothed; calyx tubular, ovoid, or campanulate, the 5 lobes equal; corolla bilabiate, the upper lip erect or spreading, the lower saccate; stamens 4.

Numerous herbaceous species of the genus occur in Mexico.

Flowers in loose panicles. Corolla 2 cm. long or larger.
Leaves clasping at base; calyx minutely glandular-puberulent_1. H. nelsonii.
Leaves not clasping; calyx glandular-hispid_____2. H. langlassei.
Flowers in heads, umbels, or fascicles, these variously arranged.
Calyx lobes spreading in fruit.
Calyx lobes in fruit equaling or usually shorter than the tube.
3. H. stellulata.
Calyx lobes longer than the tube_____4. H. mociniana.
Calyx lobes erect in fruit.
Flowers sessile or nearly so.
Calyx in fruit 8 to 10 mm. long_____5. H. rhytidea.
Calyx about 2 mm. long_____6. H. seemanni.
Flowers all or mostly slender-pedicellate.
Flowers clusters all sessile or nearly so.
Leaves with a very dense, minute, close tomentum on the upper surface_____7. H. tephrodes.
Leaves with a coarse tomentum on the upper surface, or the tomentum fine but sparse.
Leaves lance-oblong to oblong-ovate, usually acute or acuminate.
8. H. albida.
Leaves mostly rounded-ovate and very obtuse____12. H. emoryi.
Flower clusters all or mostly pedunculate.
Lobes of the calyx half as long as the tube or less___9. H. tomentosa.
Lobes of the calyx more than half as long as the tube.
Leaves soon glabrate, green.
Calyx lobes linear-subulate; leaves broadly ovate, usually acute.
10. H. laniflora.
Calyx lobes lanceolate; leaves suborbicular, rounded at apex.
11. H. insularis.
Leaves densely whitish-tomentose on one or both surfaces.
12. H. emoryi.

1. **Hyptis nelsonii** Fernald, Proc. Amer. Acad. **35**: 366. 1900.

Type collected between San Sebastián and summit of Monte Bufa de Mascota, Jalisco, altitude 1,850 meters.

Leaves linear-lanceolate, 15 to 20 cm. long, attenuate, serrulate or entire, glabrous; panicles 40 to 50 cm. long, lax; calyx in fruit 1 cm. long.

2. **Hyptis langlassei** Fernald, Proc. Amer. Acad. **45**: 422. 1910.

Type from the Sierra Madre of Michoacán or Guerrero, altitude 1,800 meters.

Shrub, 2 meters high; leaves lanceolate, 10 to 17 cm. long, acuminate, subcuneate at base, acutely dentate, glabrous; calyx in fruit 8 to 9 mm. long; corolla red.

3. **Hyptis stellulata** Benth. Lab. Gen. & Sp. 129. 1834.

Hyptis pubescens Benth. Lab. Gen. & Sp. 129. 1834.

Hyptis spinulosa Benth. Lab. Gen. & Sp. 129. 1834.

Hyptis punctata Mart. & Gal. Bull. Acad. Brux. 11^2: 186. 1844.

Sonora to Oaxaca and Morelos.

Plants shrubby or suffrutescent, 1.5 to 3 meters high; leaves narrowly lanceolate to broadly ovate or ovate-oval, 2 to 8 cm. long, obtuse to long-attenuate, serrate, puberulent or tomentulose beneath; flowers sessile or nearly so in dense clusters, these spicate-paniculate; corolla white. "Salvia cimarrona" (Sinaloa).

4. Hyptis mociniana Benth. Lab. Gen. & Sp. 129. 1834.

Veracruz and Chiapas. Central America.

Plants shrubby or suffrutescent, 1 to 2.5 meters high; leaves ovate, 2 to 4 cm. long, acuminate, rounded or subcordate at base, serrate, tomentulose beneath; flowers sessile in dense clusters, these spicate-paniculate; corolla white. "Verbena montés," "chichinguastón" (El Salvador).

5. Hyptis rhytidea Benth. Pl. Hartw. 21. 1839.

Sinaloa and Durango to Jalisco and Aguascalientes; type from Aguascalientes.

Plants shrubby or suffrutescent, 1.5 to 2.5 meters high; leaves oblong or lance-oblong, 4 to 13 cm. long, acute or obtuse, serrate, coriaceous, scabrous above, tomentose or glabrate beneath; inflorescence spicate-paniculate. "Salvia prieta" (Sinaloa).

Used in Sinaloa as a remedy for fevers.

6. Hyptis seemanni A. Gray, Proc. Amer. Acad. 21: 407. 1886.

Hyptis seemanni stenophylla Robinson, Proc. Bost. Soc. Nat. Hist. 31: 267. 1904.

Chihuahua, Sonora, and Sinaloa.

Shrub; leaves linear-lanceolate to oblong-lanceolate, 4 to 7 cm. long, attenuate, crenate or serrate, tomentose beneath; flower heads small, sessile, spicate-paniculate; calyx densely villous in the throat and outside. "Salvia" (Sinaloa).

7. Hyptis tephrodes A. Gray, Proc. Amer. Acad. 5: 164. 1861.

Baja California; type from Cape San Lucas.

Shrub, 1.5 to 2.5 meters high; leaves lanceolate or lance-oblong, 3 to 7 cm. long, acute, crenate or serrate; flower clusters spicate-paniculate, the panicles nearly naked; calyx densely white-lanate.

Doubtfully distinct from *H. albida.*

8. Hyptis albida H. B. K. Nov. Gen. & Sp. 2: 319. 1817.

Sonora and Chihuahua to San Luis Potosí, Guanajuato, and Guerrero; type from Lake Cuitzeo, Guanajuato.

Shrub, 1.5 to 4.5 meters high, stellate-tomentose throughout; leaves 2 to 6 cm. long, crenate-serrate, prominently reticulate-veined; flower clusters spicate-paniculate, the panicles leafy or naked; calyx densely white-lanate; corolla blue. "Salvia" (Sinaloa, Jalisco, Aguascalientes); "orégano" (Sinaloa); "salvia real" (Guerrero).

The leaves are sometimes used for flavoring food. In Sinaloa they are employed as a remedy for ear-ache, and in Guerrero a decoction of the plant is used in fomentations to relieve rheumatic pains.

9. Hyptis tomentosa Poit. Ann. Mus. Paris 7: 469. 1806.

Puebla and Guerrero to Chiapas.

Shrub, 1.5 to 3 meters high, stellate-tomentose; leaves oblong to ovate or oval, 1 to 7 cm. long, obtuse, crenate; flower clusters chiefly axillary, the flowers long-pedicellate; calyx stellate-tomentose; corolla about 12 mm. long, violet.

10. Hyptis laniflora Benth. Bot. Voy. Sulph. 42. *pl. 20.* 1844.

Baja California; type from Cape San Lucas.

Shrub, 1.5 to 2.5 meters high; leaves 1 to 4.5 cm. long, coarsely dentate, coriaceous; flower clusters on long, slender, usually glabrous, purplish peduncles; calyx densely white-lanate. "Salvia."

A decoction of the plant is administered as a remedy for fevers.

11. Hyptis insularis (Standl. & Goldm.) Standl.

Mesosphaerum insulare Standl. & Goldm. Contr. U. S. Nat. Herb. **13**: 375. 1911.

Type from Espíritu Santo Island, Baja California.

Shrub with spreading branches; leaves 1 to 2 cm. long, rounded or truncate at base, sinuate-dentate; peduncles slender, glabrous; calyx 6 mm. long, densely lanate.

Probably only a form of *H. laniflora.*

12. Hyptis emoryi Torr. in Ives, Rep. Colo. Riv. 20. 1861.

Sonora, Tepic, and Baja California. Southern Arizona and California.

Slender shrub, 1 to 2 meters high; leaves oblong-ovate to broadly ovate, 1 to 5 cm. long, crenate or coarsely dentate; flower clusters axillary or in nearly naked panicled racemes; calyx densely lanate; corolla violet, about 4 mm. long. "Salvia" (Sonora, Baja California).

Hyptis palmeri S. Wats.[1], described from Guaymas, Sonora, is probably not distinct.

11. MONARDELLA Benth. Lab. Gen. & Sp. 331. 1834.

At least two herbaceous species occur in Baja California.

1. Monardella thymifolia Greene, Bull. Calif. Acad. **1**: 211. 1885.

Cedros Island, Baja California.

Low shrub, puberulent throughout; leaves ovate to broadly ovate, 5 to 10 mm. long, obtuse, entire or remotely serrulate, short-petiolate; flowers in dense terminal heads, the bracts large and conspicuous; calyx tubular, 7 mm. long, equally 5-dentate; stamens 4.

12. SPHACELE Benth. in Edwards, Bot. Reg. *pl. 1289.* 1829.

Plants woody or suffrutescent; leaves crenate; flowers solitary or in few-flowered clusters, axillary or in terminal racemes; calyx campanulate, about 10-nerved, reticulate-veined, 5-dentate, the teeth subequal; corolla tube ampliate above, the limb scarcely bilabiate, 4-lobate; stamens 4.

Flowers solitary in the leaf axils; leaves 1 to 2 cm. long_____**1. S. mexicana.**
Flowers in terminal racemiform panicles; leaves 10 to 25 cm. long.
2. S. hastata.

1. Sphacele mexicana Schauer, Linnaea **20**: 707. 1847.

San Luis Potosí, Hidalgo, and Puebla; type from Zimapán, Hidalgo.

Shrub, 30 cm. high or less, densely stellate-tomentose throughout; leaves petiolate, triangular-hastate, obtuse, crenate, rugose, the margins revolute; flowers short-pedicellate, hidden among the leaves; calyx 6 mm. long.

2. Sphacele hastata A. Gray, Proc. Amer. Acad. **5**: 341. 1862.

Baja California. Hawaii.

Plants tall and coarse, perhaps wholly herbaceous, thinly or densely stellate-tomentose; leaves narrowly triangular-hastate, acute or acuminate, petiolate; calyx 6 to 7 mm. long; corolla 2.5 cm. long or less.

13. GARDOQUIA Ruiz & Pav. Prodr. Fl. Peruv. Chil. 86. 1794.

Small shrubs; leaves entire or serrate; flowers solitary or clustered in the leaf axils; calyx tubular, 13-nerved, the 5 teeth subequal; corolla tube usually exserted, the limb bilabiate; stamens 4.

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[1] Proc. Amer. Acad. **24**: 68. 1889.

Leaves linear-oblong, entire----------1. G. micromerioides.
Leaves ovate or broadly ovate, serrate.
Leaves 2 to 3 mm. long----------2. G. helleri.
Leaves mostly 5 to 9 mm. long----------3. G. mexicana.

1. Gardoquia micromerioides Hemsl. Biol. Centr. Amer. Bot. 2: 550. 1882.
San Luis Potosí.
Plant suffrutescent, 40 cm. high or less, glabrate; leaves subsessile, 6 to 18 mm. long; flowers solitary, 12 to 18 mm. long; calyx 6 to 8 mm. long.

2. Gardoquia helleri Peyr. Linnaea 30: 34. 1859.
Type from Tepetitlán, Orizaba, Veracruz, altitude 2,400 to 2,700 meters.
Small much-branched shrub; leaves short-petiolate, acutish, 2 to 4-dentate, glabrous; flowers solitary; calyx 5 to 6 mm. long, corolla 18 to 25 mm. long.
Probably only a form of *G. mexicana*.

3. Gardoquia mexicana Benth. Pl. Hartw. 50. 1840.
Hidalgo to Guerrero, Oaxaca, and Veracruz; type from Regla, Hidalgo.
Low shrub, the branchlets minutely puberulent; leaves petiolate, obtuse or acute, serrulate, glabrous; calyx 6 mm. long; corolla 22 to 34 mm. long.

148. SOLANACEAE. Potato Family.

Shrubs or trees or often herbs, erect or scandent, often armed with prickles, the pubescence frequently of branched hairs; leaves mostly alternate, simple or compound; flowers perfect, usually in cymes, regular or nearly so; calyx inferior, usually 5-parted, gamosepalous; corolla gamopetalous, varying from tubular to rotate, the limb usually 5-lobate; stamens as many as the corolla lobes and alternate with them, attached to the corolla tube; style simple, the stigma discoid or bilamellate; fruit baccate or capsular, many-seeded.

Several genera besides those listed are represented in Mexico by herbaceous species.

Ovary 1-celled----------13. LITHOPHYTUM.
Ovary with 2 or more cells.
Fruit capsular----------1. NICOTIANA.
Fruit baccate.
Embryo straight or nearly so. Leaves entire.
Fruit many-seeded; corolla lobes imbricate----------2. JUANULLOA.
Fruit few-seeded; corolla lobes induplicate-valvate----------3. CESTRUM.
Embryo curved.
Ovary 4-celled.
Corolla lobes imbricate----------4. SWARTZIA.
Corolla lobes induplicate-valvate----------5. DATURA.
Ovary 2-celled.
Corolla lobes imbricate----------6. LYCIUM.
Corolla lobes valvate or induplicate-valvate.
Corolla funnelform----------7. ACNISTUS.
Corolla salverform or campanulate.
Anthers opening by terminal pores----------8. SOLANUM.
Anthers opening by longitudinal slits.
Calyx accrescent after anthesis.
Calyx longer than the fruit and contracted above it.
9. ATHENAEA.
Calyx equaling or shorter than the fruit, not contracted.
10. WITHANIA.

Calyx only slightly if at all accrescent.
Corolla broadly campanulate, 5-angulate or shallowly lobate.
11. BRACHISTUS.
Corolla subrotate, cleft to the middle or more deeply.
12. BASSOVIA.

1. NICOTIANA L. Sp. Pl. 180. 1753.

Several herbaceous species occur in Mexico. Best known among them, of course, is the tobacco ("tabaco") plant, *Nicotiana tabacum* L.

1. Nicotiana glauca Graham, Edinburgh Phil. Journ. 1828: 174. 1828.

Sonora to Tamaulipas and Oaxaca. Western Texas to southern California; native of Argentina and Uruguay, but thoroughly naturalized in some parts of North America.

Glabrous shrub or small tree, 6 meters high or less; leaves long-petiolate, lance-oblong to broadly ovate, 5 to 17 cm. long, acute or obtuse, entire, glaucous; flowers greenish white, in lax terminal panicles; calyx tubular-campanulate, 12 mm. long, 5-dentate; corolla tubular, about 4 cm. long, villosulous, with narrow limb; fruit a 2-celled capsule, 1 to 1.5 cm. long. "Virginio" (Chihuahua, Durango); "gigante" (Aguascalientes, Sinaloa, San Luis Potosí, Texas); "tabaquillo" (Oaxaca, Mexico); "tronadora" (Chihuahua, Guanajuato, Texas); "mostaza montés" (Oaxaca); "Don Juan" (Sonora); "lengua de buey" (Sinaloa); "marihuana" (Sinaloa, Sonora); "árbol de tabaco" (Durango); "tabaco cimarrón" (Mexico); "buena moza" (Querétaro); "tepozán extranjero" (Querétaro); "tabaco amarillo" (Jalisco); "gretaña" (Oaxaca, *Reko*); "tabacón," "tacote," "palo virgin" (Durango, *Patoni*); "conetón" (Texas); "palo virgen," "Marquiana," "hierba del gigante."

This plant is abundant in some parts of Mexico. It is reputed to be very poisonous. The leaves are often applied as poultices to relieve pain, especially headache.

2. JUANULLOA Ruiz & Pav. Fl. Peruv. Chil. Prodr. 27. 1794.

1. Juanulloa mexicana (Schlecht.) Miers, Ann. Mag. Nat. Hist. 4: 188. 1849.
Laureria mexicana Schlecht. Linnaea 8: 513. 1833.
Juanulloa aurantiaca Otto & Dietr. Allg. Gartenz. 12: 265. 1844.
Juanulloa hookeriana Miers, Ann. Mag. Nat. Hist. 4: 189. 1849.
Juanulloa elliptica Ruiz & Pav.; Dunal in DC. Prodr. 13[1]: 530. 1852.

Veracruz, Oaxaca, and Chiapas; type from Hacienda de la Laguna, Veracruz.

Shrub, usually epiphytic; leaves short-petiolate, elliptic to ovate, 6 to 22 cm. long, rounded to acute at apex, acute to rounded at base, glabrous above, stellate-puberulent or tomentose beneath, entire; flowers in few-flowered long-pedunclate cymes; calyx 2.5 to 3.5 cm. long, cleft into 5 oblong-lanceolate lobes, stellate-tomentulose; corolla tubular, 4 to 4.5 cm. long, orange or reddish; fruit baccate.

3. CESTRUM L. Sp. Pl. 191. 1753.

Shrubs or small trees; leaves petiolate, entire; flowers whitish, yellowish, red, or purple, in cymes; calyx 5-lobate or 5-dentate; corolla salverform or funnelform, with long tube, the limb with 5 usually spreading lobes; stamens included, the filaments filiform, often appendaged; fruit a 2-celled berry.

Corolla red, purple, or yellow, somewhat ampliate above, contracted at the mouth.
Calyx lobes very short, obtuse. Corolla yellow, glabrous----1. C. flavescens.
Calyx lobes usually elongate, acute to attenuate.
Corolla glabrous.
Leaves glabrous beneath----2. C. endlicheri.
Leaves tomentose or villous beneath.
Calyx glabrous----3. C. purpureum.
Calyx villous----4. C. roseum.
Corolla puberulent or villous outside.
Corolla lobes broadly ovate or deltoid, short, erect---5. C. fasciculatum.
Corolla lobes lance-oblong, elongate, spreading----6. C. benthami.
Corolla usually white or greenish, the tube gradually broadened from base to apex, not contracted at the mouth.
Filaments appendaged at the point of insertion.
Leaves tomentose, pubescent, or puberulent beneath.
Pubescence of stellate hairs.
Corolla more than twice as long as the calyx----7. C. lanatum.
Corolla less than twice as long as the calyx----8. C. pacificum.
Pubescence of simple hairs.
Corolla tube 8 to 10 mm. long----9. C. dumetorum.
Corolla tube 18 mm. long----10. C. hirtellum.
Leaves glabrous beneath.
Leaves coriaceous, mostly 5 to 8 cm. wide----11. C. laurifolium.
Leaves thin or only slightly coriaceous, mostly less than 5 cm. wide.
Calyx 4 to 6 mm. long.
Corolla 20 to 26 mm. long----12. C. oblongifolium.
Corolla 15 mm. long----13. C. pedunculare.
Calyx 2 to 3 mm. long----14. C. nocturnum.
Filaments not appendaged.
Tube of the corolla twice as long as the calyx or shorter.
Calyx 10 to 15 mm. long----15. C. fulvescens.
Calyx 8 mm. long or less.
Calyx villous or tomentose----16. C. confertiflorum.
Calyx glabrous.
Calyx 4 mm. long----17. C. anagyris.
Calyx 6 to 8 mm. long----18. C. thyrsoideum.
Tube of the corolla usually more than 3 times as long as the calyx.
Corolla 8 to 12 mm. long; stigma short-exserted----19. C. diurnum.
Calyx 14 to 25 mm. long or larger; stigma usually included.
Calyx 2 to 2.5 mm. long----20. C. viride.
Calyx 4 to 6 mm. long.
Leaves thick, the lateral nerves nearly obsolete; corolla brownish or rufescent when dry----21. C. laxum.
Leaves thin, the lateral nerves conspicuous beneath; corolla greenish when dry----22. C. nitidum.

1. **Cestrum flavescens** Greenm. Proc. Amer. Acad. 34: 572. 1899.

Type from Cuernavaca, Morelos, altitude 1,500 meters.

Shrub, about 1 meter high; leaves slender-petiolate, oblong-ovate to rounded-ovate, 3 to 5 cm. long, acuminate to very obtuse at apex; flowers pedicellate; calyx 5 mm. long, glabrous; corolla 2 to 2.5 cm. long, orange.

2. Cestrum endlicheri Miers, Lond. Journ. Bot. 5: 151. 1846.

Meyenia corymbosa Schlecht. Linnaea 8: 252. 1833. Not *Cestrum corymbosum* Schlecht. 1832.

Veracruz; type from Chiconquiaco.

Glabrous shrub; leaves lance-oblong or ovate-oblong, 13 cm. long or less, long-acuminate, rounded at base; flowers in lax elongate corymbs; calyx 5 to 6 mm. long; corolla red, 2 to 2.5 cm. long.

3. Cestrum purpureum (Lindl.) Standl.

Habrothamnus purpureus Lindl. in Edwards, Bot. Reg. 30: *pl. 43*. 1844.

Habrothamnus paniculatus Mart. & Gal. Bull. Acad. Brux. 12^2: 148. 1845. Not *Cestrum paniculatum* H. B. K. 1819.

Cestrum elegans Schlecht. Linnaea 19: 261. 1847.

Cestrum sylvaticum Dunal in DC. Prodr. 13^1: 603. 1852.

Cestrum elegans truncatum Fernald, Proc. Amer. Acad. 35: 571. 1900.

Veracruz and Oaxaca; described from cultivated plants.

Shrub, 1 to 3.5 meters high; leaves short-petiolate, ovate to lance-oblong, 6.5 to 12 cm. long, acuminate, rounded or obtuse at base, subcoriaceous; flowers in dense terminal cymes; calyx 5 to 6 mm. long, purplish; corolla purple, 1.5 to 2.5 cm. long; fruit red-purple, 10 to 12 mm. long. "Flor del soldado" (Veracruz, *Ramírez*); "flor de colmena" (Veracruz, *Seler*).

Cestrum elegans truncatum is a form with subtruncate corolla limb.

4. Cestrum roseum H. B. K. Nov. Gen. & Sp. 3: 59. *pl. 197*. 1819.

Cestrum chiapense T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 192. 1915.

Hidalgo to Chiapas; type from Morán, Hidalgo; reported from Oaxaca.

Shrub; leaves oblong to elliptic-oval, 6.5 cm. long or less, acute to rounded at apex, thin, petiolate; flowers sessile or nearly so, crowded, terminal and axillary; corolla pink or purplish, 2 to 2.5 cm. long. "Hediondilla" (Hidalgo, Oaxaca, *Ramírez*).

It is possible that *C. chiapense* is a distinct species, but the specimens agree well with the descriptions of *C. roseum*.

5. Cestrum fasciculatum (Schlecht.) Miers, Lond. Journ. Bot. 5: 151. 1846.

Meyenia fasciculata Schlecht. Linnaea 8: 251. 1833.

Cestrum hartwegi Dunal in DC. Prodr. 13^1: 599. 1852.

Veracruz, Puebla, and Oaxaca; type from Chiconquiaco, Veracruz. Guatemala.

Shrub, 1 to 2 meters high; leaves lance-oblong to broadly ovate, 13 cm. long or less, acute, rounded or obtuse at base, short-petiolate; flowers in dense, chiefly terminal cymes; calyx about 6 mm. long, villosulous or glabrate; corolla about 2 cm. long, red-purple; fruit globose, 12 mm. long. "Hierba del perro" (Oaxaca, *Ramírez*).

6. Cestrum benthami Miers, Lond. Journ. Bot. 5: 151. 1846.

Habrothamnus tomentosus Benth. Pl. Hartw. 49. 1840. Not *Cestrum tomentosum* L. f. 1781.

Hidalgo, Puebla, Oaxaca, and Mexico; type from Real del Monte, Hidalgo.

Shrub, 1 to 2 meters high; leaves oblong-lanceolate to broadly ovate, 12 cm. long or less, acute or acuminate, obtuse or rounded at base, villous-tomentose beneath; flowers sessile, fasciculate chiefly terminal; calyx 8 to 10 mm. long, villous; corolla purple, 2.5 to 3 cm. long; fruit 1 to 1.5 cm. long.

7. Cestrum lanatum Mart. & Gal. Bull. Acad. Brux. 12[2]: 18. 1845.

Durango and Tepic to Chiapas and Veracruz; type from Mirador, Veracruz. Central America.

Shrub, 2 to 6 meters high; leaves mostly lanceolate or lance-oblong, 6 to 15 cm. long, acute to long-acuminate, densely stellate-tomentose beneath, at least when young; cymes dense, axillary and terminal; calyx densely tomentose; corolla greenish white, 13 to 17 mm. long; fruit about 1 cm. long. "Ahuacatillo" (Guanajuato); "candelilla" (Durango); "zorrillo" (Costa Rica); "chacuaco" (Veracruz); "palo hediondo," "huele de noche" (El Salvador).

The plant has a strong and disagreeable odor. A decoction of the wood is said to have cathartic properties, and is employed as a remedy for fevers. The black fruit is reported to yield a dye. The leaves are sometimes placed in hens' nests to keep away vermin.

8. Cestrum pacificum T. S. Brandeg. Erythea 7: 6. 1899.

Socorro Island.

Shrub, stellate-tomentose throughout; leaves oblong-ovate to broadly ovate, 6 to 11 cm. long, acute or obtuse, sometimes glabrate above in age; flowers mostly sessile, in terminal and axillary cymes; corolla 12 mm. long.

9. Cestrum dumetorum Schlecht. Linnaea 7: 61. 1832.

?*Cestrum semivestitum* Dunal in DC. Prodr. 13[1]: 651. 1852.

Nuevo León to Veracruz, Oaxaca, and Morelos; type from Veracruz.

Shrub, 2 to 6 meters high; leaves lanceolate to oblong-ovate, 16 cm. long or less, usually long-acuminate, glabrous above, sparsely villosulous or glabrate beneath; cymes small, mostly axillary; corolla about 1.5 cm. long, greenish yellow; fruit 1 cm. long or smaller, black. "Potonxihuite" (Oaxaca); "galán," "huele de día" (Nuevo León); "palo hediondo" (Tamaulipas, El Salvador); "chacuaco," "hediondilla," "tepozán" (Veracruz); "huele de noche" (Veracruz, El Salvador); "tiscuite," "hediondo" (El Salvador).

A decoction of the plant is employed in Tamaulipas as a remedy for cutaneous diseases. In El Salvador the plant is reputed to be poisonous to cattle.

10. Cestrum hirtellum Schlecht. Linnaea 7: 62. 1832.

Type from Hacienda de la Laguna, near Jalapa, Veracruz.

Leaves broadly or narrowly lanceolate, obtuse or acute, glabrate in age; calyx about 3 mm. long; corolla greenish white.

11. Cestrum laurifolium L'Hér. Stirp. Nov. 4: 69. 1785.

Cestrum alaternoides Desf. Tabl. Ecol. Bot. Mus. 70. 1804.

Michoacán and Guerrero to Veracruz. West Indies; Central America.

Shrub or small tree, 6 meters high or less, glabrous throughout or nearly so; leaves mostly elliptic-oblong and 11 to 16 cm. long, lustrous, acute or short-acuminate; cymes lateral or axillary; calyx 2.5 to 3.5 mm. long; corolla 12 to 16 mm. long, greenish white; fruit 7 to 9 mm. long. "Galán de día" (Cuba), "tiscuite," "palo hediondo," "huele de noche" (El Salvador).

12. Cestrum oblongifolium Schlecht. Linnaea 19: 266. 1847.

?*Cestrum lancifolium* Schlecht. Linnaea 19: 267. 1847.

Type from Los Reyes; the type of *C. lancifolium* collected between Los Baños and Puente de Dios, Veracruz.

Shrub, 1 to 1.5 meters high; leaves lance-oblong, 11 cm. long or less, acuminate, glabrous; calyx 4 mm. long, pubescent.

13. **Cestrum pedunculare** Pavón; Dunal in DC. Prodr. 13[1]: 618. 1852.

Type from somewhere in Mexico.

Leaves ovate-lanceolate, 5 cm. long or less, acuminate, glabrous; flowers in axillary pedunculate racemes; calyx 5 to 6 mm. long, glabrous.

14. **Cestrum nocturnum** L. Sp. Pl. 191. 1753.

Cestrum nocturnum mexicanum O. E. Schluz in Urban, Symb. Antill. 6: 256. 1909.

Coahuila to Guerrero, Oaxaca, and Veracruz. West Indies and Central America.

Shrub, 4.5 meters high or less, glabrous throughout or nearly so; leaves mostly oblong-lanceolate, 5 to 12 cm. long, acuminate; flowers mostly in axillary cymes; corolla 18 to 25 mm. long, greenish white; fruit 8 to 10 mm. long. "Huele de noche" (Puebla, Coahuila, Veracruz, Jalisco, Oaxaca, Guatemala); "hierba hedionda" (*Ramírez*); "pipiloxihuitl" (*Ramírez*); "galán de tarde" (Oaxaca, *Reko*); "galán de noche" (Guatemala, Cuba); "dama de noche" (Porto Rico, Philippines); "reina de la noche" (Guatemala); "palo hediondo" (El Salvador).

The flowers are very fragrant, especially at night. The juice and the fruit are reported to be poisonous, but an extract of the plant has been employed as an antispasmodic, especially for the treatment of epilepsy.

The Mexican and Central American material (*C. nocturnum mexicanum* O. E. Schulz) differs from the West Indian in having slightly smaller flowers. *C. graciliflorum* Dunal[1] is probably a synonym.

15. **Cestrum fulvescens** Fernald, Proc. Amer. Acad. 35: 572. 1899.

Cestrum arborescens T. S. Brandeg. Zoe 5: 256. 1908.

Michoacán to Puebla and Oaxaca; type from mountains of Telixtlahuaca, Oaxaca, altitude 2,000 meters.

Shrub, glabrous throughout or nearly so; leaves narrowly lanceolate to elliptic-oblong, 11 cm. long or less, acute or acuminate; cymes mostly axillary and racemiform, lax, the flowers mostly pedicellate; calyx angulate, somewhat inflated, contracted below into a slender stipe; corolla 2 to 2.5 cm. long; fruit 10 to 12 mm. long.

16. **Cestrum confertiflorum** Schlecht. Linnaea 19: 263. 1847.

Cestrum terminale Dunal in DC. Prodr. 13[1]: 608. 1852.

Jalisco, Michoacán, and Mexico; type from Angangueo, Michoacán.

Shrub, about 2 meters high; leaves oblong-lanceolate, 9 to 15 cm. long, acuminate, glabrous, pale beneath; cymes dense, chiefly in terminal panicles; calyx 6 to 7 mm. long; corolla 14 to 16 mm. long. "Hierba de la mula" (Mexico, *Villada*).

17. **Cestrum anagyris** Dunal in DC. Prodr. 13[1]: 608. 1852.

Mexico; type from Toluca.

Leaves ovate-elliptic, 5 cm. long or less, acute, glabrous; flowers pedicellate; corolla 10 to 11 mm. long.

18. **Cestum thyrsoideum** H. B. K. Nov. Gen. & Sp. 3: 63. 1818.

Cestrum persicaefolium Dunal in DC. Prodr. 13[1]: 608. 1852.

Cestrum involucratum Dunal in DC. Prodr. 13[1]: 610. 1852.

Michoacán, Mexico, Puebla, and Tlaxcala; type from Chalco, Mexico.

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[1] In DC. Prodr. 13[1]: 669. 1852.

Shrub, 1 to 2.5 meters high, glabrous throughout or nearly so; leaves petiolate, mostly oblong-lanceolate, 8 to 18 cm. long, acuminate or rarely obtuse, pale beneath; flowers in terminal panicled cymes; corolla about 1.5 cm. long.

19. Cestrum diurnum L. Sp. Pl. 191. 1753.

Sinaloa (probably cultivated) and Yucatán. West Indies.

Shrub, usually about a meter high; leaves oblong or oblong-elliptic, 6.5 to 12 cm. long, acute or obtuse, glabrous; flowers mostly in axillary pedunculate racemes; calyx 3.5 mm. long, glabrous or somewhat tomentose; corolla white; fruit about 6 mm. long. "Juan de noche" (Yucatán); "galán de día" (Cuba).

20. Cestrum viride Moric.; Dunal in DC. Prodr. 13^1: 606. 1852.

Described from plants cultivated in Mexico; specimens from Puebla and Michoacán or Guerrero perhaps belong here.

Shrub, 3 to 4 meters high; leaves oblong-lanceolate, 17 cm. long or less, long-acuminate, glabrous, short-petiolate, rounded or obtuse at base; flowers in axillary or terminal, often panicled cymes; corolla about 1.5 cm. long.

21. Cestrum laxum Benth. Pl. Hartw. 33. 1840.

Cestrum psychotriaefolium Schlecht. Linnaea **19**: 265. 1847.

Cestrum bourgeauianum Fernald, Proc. Amer. Acad. **35**: 572. 1900.

San Luis Potosí and Guanajuato to Mexico and Oaxaca; type from León, Guanajuato.

Shrub, 2 to 4.5 meters high, glabrous throughout or nearly so; leaves lanceolate to oblong or oblong-elliptic, 10 cm. long or less, acute or acuminate; cymes axillary and terminal, the flowers mostly pedicellate; corolla 16 to 22 mm. long. "Paloma" (Veracruz).

22. Cestrum nitidum Mart. & Gal. Bull. Acad. Brux. 12^2: 19. 1845.

Michoacán to Morelos and Oaxaca; type from mountains of Oaxaca.

Shrub or small tree, 1.5 to 6 meters high, glabrous throughout or nearly so; leaves slender-petiolate, lanceolate to elliptic, 7 to 11 cm. long, acuminate; cymes chiefly in terminal panicles, the flowers mostly pedicellate; corolla 22 to 30 mm. long.

DOUBTFUL SPECIES.

CESTRUM AMYGDALIFOLIUM Dunal in DC. Prodr. 13^1: 653. 1852. Assigned doubtfully to Mexico.

CESTRUM EHRENBERGII Dunal in DC. Prodr. 13^1: 613. 1852. Type from Chapultepec.

CESTRUM MULTINERVIUM Dunal in DC. Prodr. 13^1: 611. 1852. Type collected between Tula and Tampico.

CESTRUM PROPINQUUM Mart. & Gal. Bull. Acad. Brux 12^2: 147. 1845. Type from Jalapa, Veracruz.

4. SWARTZIA Gmel. Syst. Nat. 2: 360. 1791.

Shrubs, often scandent; leaves entire; flowers large, white or yellow; calyx tubular, 2 to 5-lobate; corolla funnelform, the lobes broad, imbricate, spreading in anthesis; stamens 5, the filaments filiform; fruit baccate, 2-celled.

Calyx and lower surface of leaves tomentose or pubescent.....1. S. guttata.
Calyx and leaves glabrous.....2. S. nitida.

1. Swartzia guttata (Don) Standl.

Solandra guttata Don in Edwards, Bot. Reg. *pl. 1551.* 1832.

Durango and Zacatecas, and perhaps elsewhere.

Plants subscandent, 7 meters long or more, the stems 5 to 7 cm. in diameter; leaves petiolate, lance-elliptic to broadly elliptic, 7 to 15 cm. long, abruptly short-acuminate, glabrate above, loosely tomentose beneath or finally glabrate; calyx 6 to 7 cm. long; corolla about 20 cm. long, cream-colored, changing in age to snuff-colored and orange, with bands of purple inside. "Floripondio del monte" (Durango).

The flowers are fragrant.

2. Swartzia nitida (Zucc.) Standl.

Solandra nitida Zucc. in Roem. Coll. Bot. 128. 1809.

Datura maxima Sessé & Moc. Pl. Nov. Hisp. 25. 1887.

Solandra selerae Dammer; Loesener, Bull. Herb. Boiss. 3: 617. 1895.

Solandra hartwegii N. E. Brown, Kew Bull. Misc. Inf. 1911: 345. 1911.

Veracruz, Puebla, and Oaxaca.

Scandent or erect shrub, glabrous; leaves long-petiolate, oblong to broadly elliptic, 7 to 18 cm. long, obtuse or abruptly short-acuminate, lustrous; calyx 5 to 7 cm. long, the lobes acuminate; corolla 18 to 25 cm. long, yellow, the limb 20 cm. broad or less. "Tecomaxochitl" (Nahuatl); "copa de oro"; "bolsa de Judas"; "gorro de Napoleón"; "tetona" (Veracruz).

A showy plant, often cultivated for ornament. The water contained in the calyx before the flowers open is said to be applied to the eyes to relieve inflammation.

This species has been reported from Mexico as *Solandra grandiflora* Swartz, a West Indian plant. *Solandra macrantha* Dunal, described from Cuba, is probably a synonym of *S. nitida.*

5. DATURA L. Sp. Pl. 179. 1753.

REFERENCE: Safford, Synopsis of the genus Datura, Journ. Washington Acad. Sci. 11: 173–189. 1921.

Shrubs or small trees, often herbs; leaves petiolate, entire, dentate, or lobate; flowers large, solitary; calyx elongate-tubular, persistent or deciduous; corolla funnelform, the limb 5-lobate; fruit capsular or baccate.

Several herbaceous species occur in Mexico.

Calyx spathaceous, the limb split along one side but otherwise entire.
1. D. candida.

Calyx limb 5-lobate.

Calyx longer than the narrow tubular portion of the corolla—**2. D. arborea.**

Calyx shorter than the narrow tubular portion of the corolla.
3. D. suaveolens.

1. Datura candida (Pers.) Pasquale, Cat. Ort. Bot. Nap. 36. 1867.

Brugmansia candida Pers. Syn. Pl. 1: 216. 1805.

Sinaloa to Veracruz and Oaxaca. Central America.

Shrub, 2.5 to 4.5 meters high; leaves long-petiolate, broadly ovate to oblong-ovate, 40 cm. long or less, acuminate, entire or repand, villosulous or glabrate; flowers sweet-scented; corolla white, about 25 cm. long, the lobes caudate-acuminate. "Floripondio" (Querétaro, Jalisco, San Luis Potosí, Oaxaca, El Salvador, Nicaragua); "floripundio," "trómbita" (Michoacán, *León*); "campanilla blanca" (Colima); "almizclillo" (*Ramírez*) "campana" (Guatemala); "reina de la noche" (Costa Rica); "florifundia," "floricundia" (El Salvador).

This plant is common in cultivation in the warmer parts of Mexico, being extremely showy when in flower. It has usually been known as *D. arborea.* Some of the cultivated forms have double flowers. It is, probably, this species of which Acosta wrote in 1606, as follows: "It is true that many of these flowers [of New Spain] are only good to look at, for their odor is not good, or is ordinary, or else they have none at all, but there are some of excellent odor. Such are those that grow on a tree called *floripondio*, which has no fruit, but bears only flowers, which are larger than fleur de lys, shaped like hand-bells, all white, and having within filaments such as one sees in a lily. It bears flowers all the year long, whose odor is wondrously sweet and pleasant, especially in the fresh morning air. The Viceroy Don Francisco de Tollede sent some of these trees to King Philip, as a thing worthy of being planted in the royal gardens."

2. **Datura arborea** L. Sp. Pl. 179. 1753.

The only Mexican specimens seen are from Sinaloa, where the plant is probably cultivated. Native of South America, the type from Peru.

Shrub or small tree; leaves broadly ovate or elliptic, acuminate, entire or repand, villosulous; corolla white, 15 to 18 cm. long, the lobes long-cuspidate; fruit subglobose, about 6 cm. long, "Floripondio" (Colombia, Peru, Ecuador); "borrachero," "guante" (Colombia); "floripundio" (Sinaloa).

In Peru the leaves are applied as poultices to sores to relieve pain and accelerate suppuration.

Datura sanguinea Ruiz & Pav., a South American species with red flowers, is cultivated about the City of Mexico.

3. **Datura suaveolens** Humb. & Bonpl.; Willd. Enum. Pl. 227. 1809.

Yucatán, probably in cultivation. Central and South America.

Shrub or small tree; leaves broadly ovate to oblong-ovate, acuminate, mostly entire, finely villosulous or glabrate; corolla white, 25 to 30 cm. long, the lobes cuspidate. "Campanilla," "flor de campana," "floripundio blanco," "árbol de la bibijagua" (Cuba).

6. LYCIUM L. Sp. Pl. 191. 1753.

Shrubs, sometimes scandent, usually spiny; leaves entire, small; flowers solitary or fasciculate in the axils or in terminal cymes, white or purplish; calyx campanulate or tubular-campanulate, 3 to 5-lobate; corolla funnelform or salverform, with short or elongate tube, the limb 4 or 5-lobate; stamens included or exserted; fruit a globose or ovoid, 2-celled berry.

The fruit of the Mexican species is edible but insipid. The Indians formerly made considerable use of it, sometimes drying and preserving it until winter. The leaves of *L. barbarum* L., of the Mediterranean region, have been employed as a substitute for Chinese tea. The young shoots of *L. europaeum* L. are said to be eaten as a vegetable in Spain and Italy.

Corolla tube 12 mm. long or more, tubular, only slightly ampliate above.

Lobes of the calyx equaling or longer than the tube.

Stamens exserted; lobes of the calyx nearly or fully twice as long as the tube ..... 1. L. macrodon.

Stamens included; lobes of the calyx about equaling the tube.

Leaves glabrous ..... 2. L. schaffneri.

Leaves glandular-puberulent ..... 3. L. puberulum.

Lobes of the calyx shorter than the tube.
Stamens exserted----4. L. exsertum.
Stamens included.
Leaves obovate to broadly elliptic, 5 to 20 mm. wide--5. L. umbellatum.
Leaves spatulate-oblanceolate, usually less than 5 mm. wide.
6. L. gracilipes.
Corolla tube 8 mm. long or less, often ampliate above.
Pedicels strongly compressed, sharply angulate above; calyx lobes very unequal, glabrous----7. L. carinatum.
Pedicels not compressed or sharply angulate; calyx lobes not very unequal or, if so, puberulent.
Calyx lobes narrow, lanceolate or subulate, equaling or longer than the tube.
Leaves glabrous; calyx lobes 1 to 1.5 mm. long----8. L. geniculatum.
Leaves usually puberulent; calyx lobes mostly 2 to 4 mm. long.
9. L. richii.
Calyx lobes broad, usually deltoid, shorter than the tube.
Lobes of the corolla longer than the tube----10. L. carolinianum.
Lobes of the corolla shorter than the tube or rarely equaling it.
Leaves sparsely short-pilose----11. L. retusum.
Leaves glabrous or minutely puberulent.
Corolla 7 to 10 mm. long.
Leaves glabrous.
Leaves 3 mm. wide or less----12. L. berlandieri.
Leaves mostly 4 to 7 mm. wide----13. L. torreyi.
Leaves puberulent----14. L. cedrosense.
Corolla 4 to 6 mm. long.
Tube of the corolla not exceeding the calyx lobes.
15. L. californicum.
Tube of the corolla not exceeding the calyx lobes.
Corolla lobes spreading or ascending----16. L. barbinodum.
Corolla lobes recurved----17. L. peninsulare.

1. **Lycium macrodon** A. Gray, Proc. Amer. Acad. 6: 46. 1862.

Sonora. Type from southern Nevada or California.

Spiny shrub; leaves oblong-oblanceolate or elliptic, 1 to 4 cm. long, obtuse or acute, glabrous; calyx 1 cm. long or less; corolla pale lilac, about 1.5 cm. long; fruit orange.

2. **Lycium schaffneri** A. Gray; Hemsl. Biol. Centr. Amer. Bot. 2: 426. 1882.

Zacatecas and San Luis Potosí; type from San Luis Potosí.

Leaves lance-oblong or oblanceolate-oblong, 1.5 to 3.5 cm. long, obtuse or acute, sessile or nearly so; calyx 4 mm. long, glabrous; corolla 1.5 cm. long; fruit about 8 mm. long.

3. **Lycium puberulum** A. Gray, Proc. Amer. Acad. 6: 46. 1862.

Western Texas, along the Rio Grande, and doubtless occurring in Mexico.

Spiny shrub, about a meter high; leaves obovate or oblanceolate-oblong, 8 to 15 mm. long, obtuse; calyx lobes spreading or recurved; corolla nearly 1.5 cm. long, white, the the lobes deltoid.

4. **Lycium exsertum** A. Gray, Proc. Amer. Acad. 20: 305. 1885.

Sonora; type from Altar.

Spiny shrub, 1 to 2 meters high; leaves spatulate-obovate or elliptic, 1 to 3.5 cm. long, acute to rounded at apex, viscid-puberulent; flowers slender-pedicellate; calyx about 6 mm. long, viscid-puberulent; corolla lobes very short, rounded; fruit orange or red.

5. **Lycium umbellatum** Rose, Contr. U. S. Nat. Herb. **1**: 74. 1890.

Baja California; type from La Paz.

Shrub, 2 to 3.5 meters high, unarmed or with spinose branchlets; leaves 1.5 to 3 cm. long, obtuse or rounded at apex, short-petiolate, viscid-puberulent; flowers long-pedicellate; calyx 6 to 8 mm. long, tubular; corolla purple, 1.5 cm. long.

6. **Lycium gracilipes** A. Gray, Proc. Amer. Acad. **12**: 81. 1877.

Northern Sonora. Arizona; type from Williams Fork.

Leaves 1 to 2 cm. long, obtuse, attenuate to base, viscid-puberulent; flowers long-pedicellate; calyx tubular-campanulate, 6 mm. long; corolla about twice as long as the calyx, purple or whitish, the lobes rounded.

7. **Lycium carinatum** S. Wats. Proc. Amer. Acad. **24**: 65. 1889.

Sonora; type from Guaymas.

Thorny, glabrous shrub, about 1 meter high; leaves linear-spatulate or narrowly spatulate, 5 to 20 mm. long, obtuse; flowers slender-pedicellate; corolla white, 4 to 6 mm. long. "Sal sieso" (*Palmer*).

8. **Lycium geniculatum** Fernald, Proc. Amer. Acad. **35**: 566. 1900.

Oaxaca and Puebla; type from Tehuacán, Puebla.

Spiny shrub; leaves oblong or obovate, 2.5 cm. long or less, obtuse or acute, very glaucous, slender-petiolate; flowers in small terminal cymes, long-pedicellate; corolla 12 mm. long, the lobes cordate.

9. **Lycium richii** A. Gray, Proc. Amer. Acad. **6**: 46. 1862.

Lycium palmeri A. Gray, Proc. Amer. Acad. **8**: 292. 1870.

Lycium pringlei A. Gray, Proc. Amer. Acad. **20**: 305. 1885.

Baja California, Sonora, and Sinaloa; type from La Paz, Baja California. Southern California.

Spiny shrub, 1.5 to 2.5 meters high, finely puberulent throughout; leaves obovate or oblanceolate, usually about 1 cm. long, obtuse or acute, sessile or nearly so; flowers short-pedicellate; calyx about 3 mm. long; corolla lilac, 8 to 10 mm. long; fruit red. "Frutilla" (Baja California).

10. **Lycium carolinianum** Walt. Fl. Carol. 84. 1788.

?*Lycium guadrifidum* Sessé & Moc.; Dunal in DC. Prodr. **13**[1]: 513. 1852.

In saline marshes or alkaline soil, Baja California, Michoacán, and Tamaulipas. Southern United States.

Glabrous spiny shrub, the long branches trailing or subscandent; leaves oblanceolate-oblong to linear-spatulate, 3 cm. long or less, obtuse or acute; flowers slender-pedicellate; calyx irregularly lobate; corolla purple, the limb subrotate, about 12 mm. broad.

11. **Lycium retusum** Robins. & Fern. Proc. Amer. Acad. **30**: 120. 1894.

Type from Oputo, Sonora.

Shrub, 2 to 3 meters high; leaves broadly obovate, 2 cm. long or less, petiolate, rounded or retuse at apex, cuneate at base; flowers slender-pedicellate; calyx tubular, 5 mm. long, glandular-pubescent; corolla 8 mm. long.

12. **Lycium berlandieri** Dunal in DC. Prodr. **13**[1]: 520. 1852.

?*Lycium brevipes* Benth. Bot. Voy. Sulph. 40. 1844.

Lycium senticosum Miers, Ann. Mag. Nat. Hist. II. **14**: 138. 1854.

Lycium stolidum Miers, Ann. Mag. Nat. Hist. II. **14**: 191. 1854.

Baja California to Nuevo León and Hidalgo. Western Texas; type from San Antonio.

Spiny shrub, 1 to 2.5 meters high; leaves linear-spatulate, obtuse, about 1 cm. long; flowers on long or short pedicels. "Cilindrillo" (Coahuila).

13. **Lycium torreyi** A. Gray, Proc. Amer. Acad. 6: 47. 1862.

Chihuahua. Western Texas to southern California; type collected in Texas on the Rio Grande.

Spiny shrub, 1 to 2.5 meters high, glabrous; leaves 3.5 cm. long or less, obtuse or acute, attenuate to base; flowers short-pedicellate; corolla about 1 cm. long, purplish; fruit red. "Garambullo" (Chihuahua); "tomatillo" (New Mexico).

14. **Lycium cedrosense** Greene, Pittonia 1: 268. 1889.

Lycium andersonii pubescens S. Wats. Proc. Amer. Acad. 24: 65. 1889.

Baja California; type from Cedros Island.

Spiny shrub, finely puberulent throughout; leaves obovate to narrowly spatulate, 1 cm. long or less, obtuse; flowers short-pedicellate.

15. **Lycium californicum** Nutt.; A. Gray in Brewer & Wats. Bot. Calif. 1: 542. 1876.

Baja California. Southern California; type from San Diego.

Low, stiff shrub; leaves linear or nearly so, 1 cm. long or less, very fleshy; flowers short-pedicellate; corolla white, the limb with 4 rounded lobes.

16. **Lycium barbinodum** Miers, Ann. Mag. Nat. Hist. II. 14: 138. 1854.

Sonora and Sinaloa to Zacatecas and Coahuila.

Shrub, 1 to 2 meters high, with spinose branchlets; leaves linear-spatulate, mostly 1 cm. long or less, obtuse; corolla white. "Agrita" (Zacatecas).

17. **Lycium peninsulare** T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 359. 1916.

Baja California; type from San José del Cabo.

Spiny glabrous shrub; leaves linear-spatulate to obovate, 2 cm. long or less, rounded or obtuse at apex; flowers on short or elongate pedicels.

Probably not distinct from *L. barbinode.*

7. ACNISTUS Schott, Wien. Zeitschr. 4: 1180. 1829.

Unarmed shrubs; leaves entire; pedicels solitary or fasciculate; calyx campanulate, truncate or 5-dentate, not accrescent; corolla tubular or funnelform, 5-lobate, the lobes induplicate-valvate; stamens 5; fruit a globose 2-celled berry.

Corolla 12 mm. long ..... **1. A. macrophyllus.**
Corolla 8 mm. long ..... **2. A. pringlei.**

1. **Acnistus macrophyllus** (Benth.) Standl.

Lycium macrophyllum Benth. Pl. Hartw. 49. 1840.

Acnistus benthami Miers, Lond. Journ. Bot. 4: 342. 1845.

Michoacán; type from Morelia.

Leaves petiolate, oblong, about 10 cm. long, acute at base and apex, glabrous above, puberulent beneath; calyx cupuliform, 3 to 4 mm. long.

2. **Acnistus pringlei** Fernald, Proc. Amer. Acad. 40: 56. 1904.

Type from Valley of Zamora, Michoacán, altitude 1,500 meters.

Shrub, 3 to 4.5 meters high; leaves elliptic-lanceolate or lance-oblong 4 to 11 cm. long, acute, thinly tomentulose or glabrate beneath; calyx 2 to 3 mm. long, glabrous, the lobes obtuse; corolla glabrous; fruit about 7 mm. in diameter.

Probably not distinct from *A. macrophyllus.*

8. SOLANUM L. Sp. Pl. 184. 1753.

REFERENCES: Dunal in DC. Prodr. 13[1]: 27–387. 1852; O. E. Schulz in Urban, Symb. Antill. 6: 149–249. 1909; Fernald, A revision of the Mexican and Central American Solanums of the subsection *Torvaria*, Proc. Amer. Acad. 35: 557–562. 1900.

Shrubs or herbs, sometimes scandent, the pubescence often of branched hairs; leaves entire, lobed, or pinnate; flowers usually cymose, racemose, or umbellate; calyx campanulate, 5-dentate or 5-lobate; corolla rotate, 5-angulate or 5-parted; filaments short, the anthers sometimes unequal, connate or connivent; fruit a globose berry.

Many herbaceous species occur in Mexico. Hemsley lists 139 species of *Solanum* from Mexico and Central America, but it is doubtful whether so many occur in the region. A rather large number of shrubby species are known to the writer only from Dunal's descriptions, and only a few of them have been placed in the following list. Many of them are based upon Pavón specimens which may have come from South America rather than Mexico.

The genus contains several species of economic importance, among which may be noted the potato, *Solanum tuberosum* L., native of the South American Andes, and the eggplant ("berenjena"), *Solanum melongena* L., a native of Asia and Africa.

A. Anthers short, the terminal pores usually anterior; plants never prickly.
Flowers mostly axillary, the pedicels solitary or fasciculate.
Calyx 5-lobate——1. S. geminiflorum.
Calyx with numerous (usually 10) lobes, or the lobes obsolete.
Pubescence of the leaves of simple hairs.
Calyx lobes obsolete——2. S. pringlei.
Calyx lobes well developed.
Calyx hirsute with long hairs——3. S. amatitlanense.
Calyx hirtellous with short subappressed hairs.
4. S. nyctaginoides.
Pubescence of branched hairs, or the leaves sometimes glabrous.
Pedicels and calyx hispid——5. S. purpusii.
Pedicels and calyx glabrous or finely stellate-pubescent.
Leaves usually rounded or obtuse at apex, nearly or fully as broad as long, broadly rounded or subcordate at base——6. S. lambii.
Leaves acute to acuminate, much longer than broad or, if obtuse, acute at base.
Corolla 6 mm. long——7. S. sideroxyloides.
Corolla over 1 cm. long.
Leaves densely and finely stellate-pubescent beneath.
8. S. lentum.
Leaves glabrous beneath or nearly so.
Leaves small, 5 cm. long or less——9. S. nocturnum.
Leaves mostly 6 to 14 cm. long.
Leaves subcoriaceous, lustrous——10. S. chiapense.
Leaves thin, dull——11. S. stephanocalyx.

Flowers in cymes, racemes, or umbels, these all or mostly pedunculate.
B. Leaves pinnate or pinnate-lobate, or hastate-lobate, sometimes simple but the plants then scandent.
Leaves entire or hastate-lobate at base, or only the lower ones pinnatisect.

Leaves hastate-lobate at base.
Corolla 5-parted----29. S. triquetrum.
Corolla 5-angulate----30. S. xanti.
Leaves not hastate-lobate.
Anthers linear, about 3 times as long as broad; leaves glabrous beneath except along the costa----12. S. jasminoides.
Anthers broadly oblong or oval, less than twice as long as broad; leaves short-villous beneath----13. S. macrantherum.
Leaves all pinnate or pinnate-lobate.
Pubescence of fine branched hairs; lobes of the leaves obtuse.
14. S. palmeri.
Pubescence of simple hairs; leaf segments acute or acuminate.
Corolla about 5 mm. long----15. S. appendiculatum.
Corolla about 10 mm. long.
Leaves glabrous beneath----16. S. seaforthianum.
Leaves villosulous beneath----17. S. galeotti.
BB. Leaves simple, entire or toothed, never hastate-lobate; plants commonly erect.
C. Mature leaves densely stellate-pubescent beneath over the whole surface.
Flowers in few-flowered lateral umbels.
Corolla lobes ascending----18. S. lignescens.
Corolla lobes reflexed.
Hairs on the upper surface of the leaves mostly simple.
19. S. plurifurcipilum.
Hairs on the upper surface of the leaves all branched.
20. S. jaliscanum.
Flowers in many-flowered cymes, these often terminal.
Younger branches with coarse, conspicuously stipitate, branched hairs----21. S. umbellatum.
Younger branches with fine stellate hairs, these sessile or nearly so.
Leaves glabrous on the upper surface or nearly so, attenuate at base----27. S. cervantesii.
Leaves densely stellate-pubescent on the upper surface or, if glabrate, obtuse or rounded at base.
Petioles very short, less than 1 cm. long; calyx shallowly and obtusely denticulate----22. S. salviifolium.
Petioles usually more than 1 cm. long; calyx deeply dentate.
Ovary tomentose; leaves velutinous-tomentose on the upper surface----23. S. verbascifolium.
Ovary glabrous; leaves stellate-scaberulous on the upper surface or glabrate.
Hairs on the lower surface of the leaf extremely minute, the leaves appearing glabrous----24. S. plumense.
Hairs on the lower surface of the leaf conspicuous.
25. S. bicolor.
CC. Mature leaves glabrous beneath or nearly so, the pubescence, if any, chiefly along or near the costa, or the leaves sometimes rather densely pubescent with simple hairs.
Flowers in large many-flowered cymes, these chiefly terminal.
Branches winged----26. S. aligerum.
Branches not winged----27. S. cervantesii.

Flowers in few-flowered lateral umbels or racemes.
Pubescence of the leaves of simple hairs.
Corolla about 5 mm. long——28. S. nigrum.
Corolla about 10 mm. long——30. S. xanti.
Pubescence none or of branched hairs.
Young branchlets with a feltlike tomentum—31. S. brachystachys.
Young branchlets glabrous or obscurely puberulent.
Leaves acuminate; pedicels usually recurved in fruit.
32. S. nudum.
Leaves mostly obtuse; pedicels erect in fruit—33. S. diphyllum.
AA. Anthers more or less elongate, the terminal pores posterior or directed upward; plants nearly always armed with prickles.
D. Prickles of the stems strongly recurved; leaves not prickly on the upper surface.
Leaves glabrous on the upper surface, or pubescent with simple hairs.
Leaves entire——34. S. oaxacanum.
Leaves all or mostly pinnate-lobate——35. S. refractum.
Leaves sparsely or densely stellate-pubescent on the upper surface.
Branches glabrous or nearly so——36. S. houstonii.
Branches copiously pubescent, the indument variable in character.
Prickles of the stems large, few, mostly 3 to 6 mm. long.
Leaves cuneate-decurrent at base, sessile or nearly so.
37. S. jamaicense.
Leaves not cuneate-decurrent at base, petiolate.
Leaves green beneath, sparsely stellate-hirsute.
38. S. donnell-smithii.
Leaves whitish-tomentose beneath——39. S. amictum.
Prickles of the stems small, numerous, most of them 2 mm. long or less——40. S. lanceifolium.
DD. Prickles straight or only slightly curved, or sometimes wanting, rarely recurved but the leaves then prickly on the upper surface.
Fruit densely hirsute.
Prickles of the stem glandular-puberulent——41. S. hirtum.
Prickles not glandular-puberulent——42. S. tequilense.
Fruit glabrous or nearly so.
Pubescence of the upper surface of the leaves chiefly of long simple hairs.
Calyx and pedicels not prickly——43. S. mammosum.
Calyx and pedicels prickly.
Leaves sparsely hirsute on the upper surface, with few scattered stellate hairs beneath——44. S. aculeatissimum.
Leaves densely pilose above, densely stellate-pubescent beneath.
35. S. chloropetalum.
Pubescence of the upper surface of the leaves chiefly of fine stellate hairs.
Calyx accrescent after anthesis, usually closely investing the fruit and nearly or quite equaling it.
Leaves all entire——46. S. hindsianum.
Leaves, at least most of them, undulate or lobate.
Shorter anthers 1.5 cm. long or more; leaves lobed nearly to the costa——47. S. azureum.
Shorter anthers 1 cm. long or less; leaves usually shallowly lobate——48. S. amazonium.

Calyx slightly if at all accrescent, much shorter than the fruit, usually spreading.
Fruit 3 cm. in diameter or larger----------49. S. marginatum.
Fruit usually less than 2 cm. in diameter.
Stems bristly-hispid, each bristle with a tuft of hairs at apex.
50. S. hispidum.
Stems not hispid.
Pubescence of the pedicels partly of gland-tipped hairs.
Leaves deeply lobate----------51. S. hernandesii.
Leaves shallowly lobate or entire.
Pedicels erect in fruit----------52. S. torvum.
Pedicels reflexed in fruit----------53. S. madrense.
Pubescence of the pedicels eglandular.
Anthers 8 to 10 mm. long----------54. S. mitlense.
Anthers about 5 mm. long.
Leaves acute to attenuate at base, entire.
55. S. laurifolium.
Leaves usually obtuse to subcordate at base, most of them undulate or sinuate-lobate------56. S. diversifolium.

1. Solanum geminiflorum Mart. & Gal. Bull. Acad. Brux. 12[1]: 142. 1845.
Type from Chinantla, Oaxaca.
Glabrous shrub; leaves ovate-lanceolate, 7 to 10 cm. long, acuminate, attenuate at base, entire; pedicels geminate; flowers white, 6 mm. long.
Solanum hookerianum Spreng., listed by Hemsley, is a synonym of *S. havanense* Jacq., and is not known from Mexico.

2. Solanum pringlei Robins. & Greenm. Amer. Journ. Sci. 50: 160. 1895.
Jalisco and Michoacán; type from Lake Chapala, Jalisco.
Plants suffrutescent, about 2 meters high, the branches viscid-villous; leaves broadly ovate, 5 to 12 cm. long, long-acuminate, broadly rounded and short-decurrent at base, short-villous; pedicels geminate, recurved in fruit; corolla nearly 1.5 cm. long; fruit bright red, 1.5 cm. long, glabrous.

3. Solanum amatitlanense Coult. & Donn. Smith, Bot. Gaz. 37: 420. 1904.
Chiapas. Guatemala; type from Amatitlán.
Shrub, the branches hirsute with forked hairs; leaves on very short petioles, oblong-lanceolate or elliptic-oblong, 20 cm. long or less, long-acuminate, obtuse or acute at base and very unequal, entire, hirsute; pedicels fasciculate.
The writer has seen no material of *S. sylvicola* T. S. Brandeg.,[1] described from Finca Irlanda, Chiapas, which may be a synonym of this species.

4. Solanum nyctaginoides Dunal in DC. Prodr. 13[1]: 172. 1852.
Hidalgo and probably elsewhere; described from somewhere in Mexico.
Slender shrub, 3 to 4.5 meters high, the branches hirtellous; leaves slender-petiolate, lanceolate to ovate-elliptic, 13 cm. long or less, long-acuminate, attenuate at base, pilose-hirsute, entire; pedicels fasciculate; corolla 10 to 14 mm. long; fruit globose, orange.

5. Solanum purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 62. 1914.
Type from Finca Mexiquito, Chiapas.
Slender shrub, the branches hirsute with branched hairs; leaves short-petiolate, oblong-ovate, 12 cm. long or less, acuminate, rounded at base, entire, sparsely hirsute above, sparsely stellate-pubescent beneath; pedicels solitary or geminate; calyx lobes in fruit sometimes 1.5 cm. long; fruit 1.5 cm. in diameter.

[1] Univ. Calif. Publ. Bot. 6: 373. 1917.

6. **Solanum lambii** Fernald, Bot. Gaz. 20: 536. 1895.

Sinaloa and Jalisco; type from Villa Unión, Sinaloa.

Woody vine, the branches stellate-pubescent; leaves slender-petiolate, rounded-ovate, 4 cm. long or less, entire, finely stellate-pubescent or rarely glabrate; pedicels geminate or fasciculate; corolla bluish, 1.5 cm. long; fruit 5 to 6 mm. in diameter, glabrous.

7. **Solanum sideroxyloides** Schlecht. Linnaea 8: 253. 1833.

Type from Hacienda de la Laguna, Veracruz.

Shrub, the branches stellate-tomentose; leaves petiolate, ovate or oblong-ovate, 7 cm. long or less, acute or short-acuminate, obtuse at base, entire, brownish-tomentose beneath; pedicels fasciculate; corolla white; fruit glabrous.

8. **Solanum lentum** Cav. Icon. Pl. 4: 4. *pl. 308.* 1797.

Solanum stellatum lentum O. E. Schulz in Urban, Symb. Antill. 6: 189. 1909.

Tamaulipas, Veracruz, and Oaxaca. Cuba, Guatemala, and El Salvador.

Shrub, trailing or scandent, sometimes 3 meters long, the branches densely stellate-pubescent; leaves ovate or oblong-ovate, 6.5 cm. long or less, entire, obtuse or rounded at base; pedicels usually fasciculate; corolla usually violet, 14 to 18 mm. long; fruit red, 6 to 8 mm. in diameter, glabrous. "Quesillo," "manzana montés," "guaco" (El Salvador).

Closely related to *S. virgatum* Lam., a West Indian species, and perhaps not distinct.

9. **Solanum nocturnum** Fernald, Proc. Amer. Acad. 35: 570. 1900.

Guerrero and Oaxaca; type from Acapulco.

Woody vine, the branches minutely stellate-pubescent or glabrate; leaves slender-petiolate, acute or obtuse, entire, finely and sparsely stellate-pubescent when young but soon glabrous; pedicels solitary or geminate; corolla 12 to 15 mm. long; fruit 1 cm. in diameter.

10. **Solanum chiapense** T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 192. 1915.

Type from Finca Irlanda, Chiapas.

Shrub, glabrous throughout, probably scandent; leaves on very short petioles, elliptic or lance-oblong, 10 cm. long or less, narrowed to the obtuse or acutish apex, obtuse or subacute at base, entire; pedicels solitary or geminate; anthers unequal.

11. **Solanum stephanocalyx** T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 374. 1917.

Veracruz; type from Zacuapan.

Plants slender, herbaceous or fruticose, the branches puberulent or nearly glabrous; leaves petiolate, ovate or elliptic-ovate, 14 cm. long or less, acute to rounded at base, entire, puberulent beneath along the veins or glabrous; pedicels solitary or geminate; corolla 12 to 18 mm. long.

12. **Solanum jasminoides** Paxton, Mag. Bot. 8: *pl. 5.* 1841.

Morelos and Veracruz, naturalized; cultivated about the City of Mexico. Native of Brazil.

Plants scandent, suffrutescent, puberulent or glabrous; leaves slender-petiolate, triangular-ovate, 5 cm. long or less, narrowed to the obtuse or acute apex, rounded to subcordate at base, entire, glabrous or nearly so, the lower leaves usually parted or cleft; flowers slender-pedicellate, in large cymes; corolla white or bluish, nearly 2 cm. broad. "Flor de San Diego" (Veracruz).

13. **Solanum macrantherum** Dunal, Sol. Syn. 16. 1816.

Michoacán and Guanajuato to Veracruz and Chiapas.

Scandent shrub, the branches villosulous; leaves long-petiolate, ovate to broadly ovate, 13 cm. long or less, acuminate, rounded or truncate at base, entire, puberulent or short-villous beneath or sometimes glabrate; cymes large, many-flowered; corolla violaceous, 2 to 4 cm. broad; flowers sweet-scented; fruit red, about 1 cm. or less in diameter.

Solanum boldoense A. DC., described from Cuba, is a closely related species and perhaps not distinct. It has been reported from Mexico.

14. **Solanum palmeri** Vasey & Rose, Proc. U. S. Nat. Mus. **11**: 532. 1889.

Baja California and the adjacent islands; type from San Quentín Bay.

Plants suffrutescent, minutely pubescent with branched hairs; leaves nearly all lobate, usually 3-lobate, the lower lobes sometimes very small or suppressed; flowers in few-flowered umbels; corolla violaceous, 1.5 cm. broad.

15. **Solanum appendiculatum** Dunal, Sol. Syn. 5. 1816.

High mountains, Mexico, Veracruz, and Oaxaca; type from Puente de la Madre de Dios. Guatemala.

Slender shrub, scandent to a height of 9 meters, the branches puberulent or glabrate; leaflets 3 or 5, lance-oblong to ovate, 5 cm. long or less, acuminate, acute at base, entire, very sparsely short-hirsute above, puberulent beneath along the veins; cymes small, few-flowered; corolla white; fruit 6 to 8 mm. in diameter.

16. **Solanum seaforthianum** Andrews, Bot. Rep. **8**: *pl. 504*. 1797–1804.

Specimens seen from Baja California, Tamaulipas, Michoacán or Guerrero (?), and Yucatán, most of them probably from cultivated plants. West Indies, Central America, and northern South America.

Scandent shrub, 2 to 6 meters long, the branches sparsely puberulent or glabrate; leaflets 3 or 5, oblong-lanceolate to ovate, 8 cm. long or less, entire, the upper ones decurrent upon the petiole, glabrous or nearly so; cymes usually large and many-flowered; corolla violaceous, nearly 1 cm. long; fruit red, 6 to 9 mm. in diameter. "Piocha" (Yucatán); "guinda," "falsa belladonna," "jazmín de Italia" (Porto Rico); "Josefina," "dulceamarga" (El Salvador).

This is probably the plant reported from Mexico by various writers as *S. dulcamara* L., and said to be known as "gloria" and "guía de jazmincillo." It is a handsome vine and is commonly cultivated in Mexico and Central America.

17. **Solanum galeotti** Dunal in DC. Prodr. **13**[1]: 82. 1852.

Type from Ario, Michoacán.

Scandent shrub; leaves long-petiolate, 5-parted, the segments ovate-oblong, 7 cm. long or less, acutish; corolla white.

Solanum stephanodes Schlecht.,[1] described from Cumbre del Obispo, appears, from the description, to be closely related.

18. **Solanum lignescens** Fernald, Proc. Amer. Acad. **33**: 91. 1897.

Guerrero to Chiapas; type from Acapulco, Guerrero.

Shrub, the branches closely stellate-pubescent; leaves petiolate, ovate or elliptic, 7 cm. long or less, obtuse or acute, closely stellate-pubescent; umbels short-pedunculate; corolla white, 1.5 cm. broad; fruit glabrous, 1 cm. in diameter.

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[1] Linnaea **19**: 290. 1846.

19. Solanum plurifurcipilum Bitter, Repert. Sp. Nov. Fedde 11: 15. 1912.

Type from Pacho Forest, near Jalapa, Veracruz, altitude 1,200 meters.

Shrub, 0.5 to 1 meter high, the stems pubescent with coarse branched hairs; leaves short-petiolate, ovate-oblong or ovate, 7.5 cm. long or less, acute, short-decurrent at base, entire; umbels short-pedunculate; corolla white, about 1 cm. broad.

The description of *S. ulmoides* Dunal [1] is strongly suggestive of this plant.

20. Solanum jaliscanum Greenm. Proc. Amer. Acad. 34: 571. 1899.

Barranca near Guadalajara, Jalisco, altitude 1,200 meters, the type locality.

Shrub, the branches stellate-pubescent; leaves ovate-oblong or lance-oblong, 13 cm. long or less, acute or obtuse, acute at base, entire, finely stellate-pubescent; umbels short-pedunculate; corolla about 1 cm. broad; fruit 1 cm. in diameter, glabrous.

21. Solanum umbellatum Mill. Gard. Dict. ed. 8. *Solanum* no. 27. 1768.

Solanum granuloso-leprosum Dunal in DC. Prodr. 13[1]: 115. 1852.

Solanum cortex-virens Dunal in DC. Prodr. 13[1]: 372. 1852.

Solanum receptum Heurck & Muell. Arg.; Heurck, Obs. Bot. 1: 46. 1870.

Sonora to Tamaulipas, Veracruz, and Oaxaca. West Indies and Central America.

Shrub or small tree, 1 to 6 meters high; leaves oblong-elliptic to oblanceolate, 20 cm. long or less, acuminate, long-attenuate at base, finely stellate-pubescent above, green, beneath pubescent with branched, chiefly stipitate hairs; cymes dense, many-flowered, long-pedunculate; corolla white, 7 to 9 mm. long; fruit yellow, 1 to 1.5 cm. in diameter. "Berenjena" (Sinaloa); "cazaniche" (*Villada*); "friega-plato" (Nicaragua); "prendedera macho" (Cuba); "tapalayote" (El Salvador).

The specimens which belong here have nearly always been referred to *S. callicarpifolium* Kunth & Bouché.

22. Solanum salviifolium Lam. Tabl. Encycl. 2: 14. 1793.

Solanum geminifolium ("*geminiflorum*") Schlecht. Linnaea 5: 112. 1830.

Solanum schlechtendalianum Walp. Repert. Bot. 3: 61. 1844–45.

Michoacán or Guerrero to Chiapas, Tabasco, and Veracruz. West Indies and Central America.

Shrub or small tree, 2 to 4.5 meters high, the branches densely stellate-tomentose; leaves often subsessile, lance-oblong to broadly ovate, 15 cm. long or less, acuminate, rounded or subcordate at base, green above, usually glabrate, densely and finely stellate-tomentose beneath with whitish hairs; cymes long-pedunculate, becoming lateral; corolla white, 7 mm. long or less; fruit 7 mm. in diameter, glabrate.

23. Solanum verbascifolium L. Sp. Pl. 184. 1753.

Nearly throughout Mexico except Baja California. Southern Florida; Central America; Old World tropics.

Shrub or small tree, 2 to 10 meters high, the branches finely stellate-tomentose; leaves petiolate, ovate to lanceolate, 25 cm. long or less, acute or acuminate, rounded at base or decurrent, entire, velvety-tomentose on both surfaces; cymes long-pedunculate; corolla white, 7 to 9 mm. long; fruit yellowish, 6 to 12 mm. in diameter. "Salvadora" (Tamaulipas); "saca-manteca" (Sinaloa); "guardolobo" (Nuevo León); "xtuhuy," "tom-paap," "xaxox" (Yucatán, Maya); "zoza" or "sosa" (Morelos, Veracruz, San Luis Potosí); "hierba de San Pedro" (Nuevo León); "hoja de manteca" (*Conzatti*);

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[1] In DC. Prodr. 13[1]: 130. 1852.

"galantea" (Oaxaca, *Reko*); "friega-plato," "berenjena" (Veracruz); "tabaco cimarrón," "prendedera hedionda," "prendedera macho," "pendejera macho" (Cuba); "berenjena de paloma," "berenjena cimarrona," "tabacón pelado" (Porto Rico); "tapalayote" (El Salvador).

The soft velvet-like leaves are used for cleaning dishes. They are also heated and applied to the forehead to relieve headache, and applied as poultices to ulcers and boils.

24. **Solanum plumense** Fernald, Proc. Amer. Acad. **35**: 569. 1900.

Type from Pluma, Oaxaca.

Shrub, the branches very minutely stellate-puberulent; leaves ovate-lanceolate, 10 to 18 cm. long, long-acuminate, acutish to rounded at base, entire; cymes long-pedunculate; corolla white, 1.5 cm. broad; fruit 1 cm. in diameter.

25. **Solanum bicolor** Willd.; Roem. & Schult. Syst. Veg. 4: 661. 1819.

Solanum callicarpifolium Kunth & Bouché, Ind. Sem. Hort. Berol. 10. 1845.

Sinaloa to Chiapas and Yucatán. Lesser Antilles, Central America, and northern South America.

Shrub, 1.5 to 3 meters high, the branches finely stellate-pubescent; leaves elliptic to oblong-oblanceolate, usually 10 to 30 cm. long, acute or short-acuminate, decurrent at base, entire, green above; cymes long-pedunculate; corolla white, about 7 mm. long; fruit 6 to 8 mm. in diameter, yellow. "Saca-manteca" (Sinaloa).

26. **Solanum aligerum** Schlecht. Linnaea **19**: 301. 1846.

Michoacán, Mexico, Hidalgo, and Veracruz; type from Angangueo, Michoacán.

Shrub or small tree; leaves short-petiolate, oblong-lanceolate, 16 cm. long or less, acute at base, entire, glabrous above, barbate beneath along the costa or when young loosely tomentose with branched hairs; panicles pedunculate, lax; corolla white, 6 mm. long; fruit glabrous, 1 cm. in diameter.

27. **Solanum cervantesii** Lag. Nov. Gen. & Sp. 10. 1816.

Solanum pubigerum Dunal, Sol. Syn. 160. *pl. 6.* 1816.

San Luis Potosí and Guanajuato to Chiapas and Veracruz. Guatemala.

Shrub, 1 to 4.5 meters high, the branches puberulent or glabrous; leaves long-petiolate, lanceolate to oblong-elliptic, 24 cm. long or less, acute or acuminate, acute or decurrent at base, usually more or less pubescent beneath but often glabrous; cymes long-pedunculate; corolla white, 5 to 7 mm. long; fruit black, 5 to 7 mm. in diameter. "Hierba del perro" (San Luis Potosí).

The fruit is said to be eaten by children and to be harmless.

28. **Solanum nigrum** L. Sp. Pl. 186. 1753.

Solanum americanum Mill. Gard. Dict. ed. 8. *Solanum* no. 5. 1768.

Solanum oligospermum Bitter, Repert. Sp. Nov. Fedde **12**: 80. 1913.

Nearly throughout Mexico. Widely distributed in tropical and temperate regions of both hemispheres.

Usually herbaceous but sometimes woody and as much as 3 meters high, the branches puberulent or villosulous; leaves long-petiolate, mostly ovate, 10 cm. long or less, acute or acuminate, obtuse or rounded at base, sinuate-dentate or frequently entire; umbels slender-pedunculate; corolla white or bluish, 2 to 4 mm. long; fruit 5 to 7 mm. in diameter, black. "Mora" (Jalisco, etc.); "chuchilitas" (Sonora); "tohonchichi" (Oaxaca); "hierba mora" (Tamaulipas, Durango, San Luis Potosi, Oaxaca, Sonora, Cuba, Porto Rico, El Salvador,

Costa Rica, Peru, Colombia); "chichiquelite" (Durango); "tzopilotlaquatl" (*Ramírez*); "thucupache xaqua" (Michoacán, Tarascan, *León*); "bitaxe" (Oaxaca, Zapotec, *Reko*); "mata-gallinas" (Porto Rico).

Black nightshade is a common weed in Mexico as well as in the United States. The berries are commonly believed to be poisonous and there is little doubt that they are in some instances, but some forms of the plant have been introduced into cultivation under the names "wonderberry" and "garden huckleberry," and their fruit is quite harmless and highly valued by many persons, especially for making pies. In Mexico and Central America the young shoots and leaves are commonly cooked as a pot herb, and the same practice is followed in Mauritius, Madagascar, and other countries. In Sinaloa the root is said to have been employed as a remedy for bubonic plague. Elsewhere in Mexico the fruit is a domestic remedy for erysipelas, and a decoction of the plant is employed as a fomentation for sore eyes and for various skin diseases. The leaves are sometimes applied as poultices to allay pain. In Europe the plant is generally reputed to have narcotic properties, and in Bohemia the leaves are placed in the cradles of infants to promote sleep.

Solanum nigrum is a somewhat variable plant, and many of the forms (including several from Mexico) have been described as distinct species.

29. **Solanum triquetrum** Cav. Icon. Pl. 3: 30. *pl. 259*. 1794.

Coahuila, Nuevo León, and San Luis Potosí. Western Texas.

Plants erect or subscandent, a meter high or less, suffrutescent, nearly glabrous; leaves 5 cm. long or less, most of them triangular-hastate or lance-hastate, acute or acuminate; cymes umbelliform, few-flowered; corolla white or violet; fruit red, about 1 cm. in diameter.

30. **Solanum xanti** A. Gray, Proc. Amer. Acad. 11: 90. 1876.

Northern Baja California. California; type from Fort Tejon.

Plants suffrutescent, the stems viscid-pubescent; leaves lanceolate to ovate, 1 to 4 cm. long, obtuse, entire or sometimes auriculate-lobate at base, viscid-pubescent; corolla blue or violet, about 2 cm. broad; fruit purplish black.

31. **Solanum brachystachys** Dunal in DC. Prodr. 13[1]: 128. 1852.

Solanum lucidum Mart. & Gal. Bull. Acad. Brux. 12[1]: 137. 1845. Not *S. lucidum* Moric. 1830.

Solanum venosum Sendtn. in Mart. Fl. Bras. 10: 29. 1846. Not *S. venosum* Humb. & Bonpl. 1819.

Mexico, Oaxaca, and Chiapas; type from Chalco, Mexico. Guatemala.

Shrub; leaves petiolate, lanceolate to elliptic, 6 to 9 cm. long, short-acuminate or acute, obtuse or acute at base, glabrous above, glabrous beneath or when young with a loose feltlike tomentum; corolla 8 to 10 mm. broad; fruit glabrous, about 1 cm. in diameter.

Solanum nigricans Mart. & Gal.,[1] described from Oaxaca, is a closely related plant and perhaps not distinct.

32. **Solanum nudum** H. B. K. Nov. Gen. & Sp. 3: 33. 1818.

Michoacán to Veracruz and Chiapas; type from Jalapa, Veracruz. Central America.

Shrub, 2 to 4.5 meters high, the branches glabrous; leaves oblong-lanceolate to elliptic, 15 cm. long or less, acute at base, usually barbate beneath along the costa; corolla white, 4 to 6 mm. long; fruit about 1 cm. in diameter.

The Mexican specimens have usually been referred to *S. triste* Jacq.

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[1] Bull Acad. Brux. 12[1]: 134. 1845.

33. **Solanum diphyllum** L. Sp. Pl. 184. 1753.

Tepic to Tamaulipas, Veracruz, and Oaxaca. Guatemala and El Salvador.

Shrub, 1 to 1.5 meters high, the branches glabrous or obscurely puberulent; leaves petiolate, lanceolate to oblong-elliptic, 12 cm. long or less, acute or attenuate at base, lustrous, glabrous beneath; corolla white, 3 to 4 mm. long; fruit 6 to 7 mm. in diameter. "Amatillo," "hoja del golpe" (El Salvador).

34. **Solanum oaxacanum** Dunal in DC. Prodr. 13[1]: 204. 1852.

Solanum hamatile T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 192. 1915.

Oaxaca and Chiapas; type from Tehuantepec, Oaxaca.

Shrub, glabrous throughout, the branches armed with short remote recurved prickles; leaves long-petiolate, oblong-lanceolate to ovate-elliptic, 8 cm. long or less, acute, decurrent at base, thin, paler beneath and sometimes prickly along the costa; inflorescence few-flowered, the floweres long-pedicellate; corolla about 1 cm. long.

35. **Solanum refractum** Hook. & Arn. Bot. Beechey Voy. 304. 1839–40.

Sinaloa to Jalisco and Morelos; type from Tepic.

Shrub, usually scandent, the branches densely prickly; leaves mostly oblanceolate or obovate, 30 cm. long or less, obtuse to acuminate, long-attenuate to the base, sessile or nearly so, entire or usually lobate, prickly beneath, glabrous or pilose; flowers racemose-cymose, the inflorescences lax, many-flowered; corolla 12 mm. long, white; fruit about 5 cm. in diameter. "Toronja" (Sinaloa).

36. **Solanum houstoni** Dunal, Hist. Sol. 243. 1813.

Solanum tampicense Dunal in DC. Prodr. 13[1]: 284. 1852.

Tamaulipas and Veracruz; type from Veracruz. Cuba; El Salvador.

Shrub, 1 to 2 meters high, the branches armed with stout recurved prickles; leaves petiolate, oblong or oblong-ovate, 13 cm. long or less, obtuse or acute, cuneate at base, irregularly lobate, sparsely stellate-pubescent; flowers in axillary umbels or racemes; corolla white, 6 to 11 mm. long; fruit red, 6 to 7 mm. in diameter, glabrous. "Ajicón" (Cuba); "huistomate," "huevo de gato" (El Salvador).

37. **Solanum jamaicense** Mill. Gard. Dict. ed. 8. *Solanum* no. 17. 1768.

Solanum cuneifolium Dunal, Hist. Sol. 193. *pl. 22.* 1813.

Oaxaca. West Indies; Central and South America; type from Jamaica.

Shrub, often scandent, the branches densely tomentose with chiefly stipitate, stellate hairs; leaves broadly ovate or elliptic, 25 cm. long or less, acute, angulate-lobate, densely tomentose with coarse stipitate stellate hairs, often prickly beneath; inflorescences lateral, few-flowered; corolla white, 8 mm. long; fruit orange, 4 to 6 mm. in diameter. "Berenjena" (Porto Rico).

38. **Solanum donnell-smithii** Coult. Bot. Gaz. **16**: 144. 1891.

Veracruz, Oaxaca, and Chiapas. Central America; type from Escuintla, Guatemala.

Erect or scandent shrub, the branches hispid with coarse long-stipitate stellate hairs; leaves oblong to ovate, 16 cm. long or less, acute, usually obtuse at base, entire, lobate, or sinuate, usually prickly beneath; cymes few-flowered, lateral; calyx prickly; corolla 1.5 cm. long, parted nearly to the base, white; fruit glabrous, nearly 1 cm. in diameter. "Huistomate" (El Salvador).

39. **Solanum amictum** Moric.; Dunal in DC. Prodr. 13[1]: 263. 1852.

Veracruz and perhaps elsewhere; type from Cordillera of Guichilaca.

Branches stellate-hirsute; leaves ovate-lanceolate, 20 cm. long or less, acuminate, sinuate-repand, stellate-pilose above; cymes lateral, many-flowered; calyx hirsute; fruit 6 mm. in diameter.

This species may not be correctly placed in the key. It is known to the writer only from description.

40. Solanum lanceifolium Jacq. Coll. Bot. 2: 286. 1788.

Tamaulipas, San Luis Potosí, and Veracruz. West Indies, Central America, and northern South America.

Shrub, usually scandent, the branches stellate-pubescent; leaves petiolate, ovate to oblong, 15 cm. long or less, acute or obtuse, acute to rounded at base, sparsely stellate-pubescent above, densely so beneath and usually prickly; inflorescences lateral, few-flowered, racemiform; corolla white, 9 to 12 mm. long; fruit red, 6 to 9 mm. in diameter.

41. Solanum hirtum Vahl, Symb. Bot. 2: 40. 1791.

Solanum flavescens Dunal; Poir. Encycl. Suppl. 3: 778. 1813.

Solanum molestum T. S. Brandeg. Univ. Calif. Publ. Bot. 7: 331. 1920.

Veracruz and Yucatán. Guatemala; West Indies and northern South America.

Shrub, 2.5 meters high or less, the branches stellate-tomentose, densely prickly; leaves broadly ovate to suborbicular, 20 cm. long or less, acute or obtuse, cordate at base, sinuate-lobate, prickly, at least beneath, densely stellate-tomentose beneath; inflorescences lateral, 2 to 8-flowered; calyx 1 cm. long, deeply parted, the lobes obtuse or acutish; corolla white, 1.5 cm. long; fruit about 2 cm. in diameter, yellow, covered with long yellow hairs.

42. Solanum tequilense A. Gray, Proc. Amer. Acad. 22: 441. 1887.

Solanum huitlanum T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 192. 1915.

Tepic to Chiapas; type from Tequila, Jalisco. Guatemala.

Erect shrub, the branches stellate-tomentose, densely covered with long stout prickles; leaves oval to rounded-ovate, 40 cm. long or less, obtuse or acute, rounded or subcordate at base, densely stellate-tomentose, sinuate-repand, usually prickly on both surfaces, the prickles sometimes 3 cm. long; inflorescences few-flowered; fruit 2.5 to 3.5 cm. in diameter.

43. Solanum mammosum L. Sp. Pl. 187. 1753.

Reported from Veracruz by Hemsley, but perhaps erroneously; reported from Mexico by O. E. Schulz.[1] West Indies; Central and South America.

Plants herbaceous or suffrutescent, 1.5 meters high or less, densely pilose with long articulate hairs; leaves nearly as broad as long, 10 to 15 cm. long, shallowly cordate at base, irregularly lobate, the lobes obtuse or acute, usually armed on both surfaces with long stout prickles; inflorescences umbelliform, lateral, 1 to 6-flowered; corolla violaceous, about 2 cm. long; fruit 3 to 4.5 cm. in diameter, orange. "Berenjena" (Veracruz); "berenjenita peluda" (Tabasco, *Rovirosa*); "pichichío" (Costa Rica); "uña de gato" (Panama); "chichimora" (El Salvador); "chichihua" (Honduras); "chichigua," "chichita," "marimbita amarilla," "chichona" (Nicaragua); "rejalgar" (Colombia); "berenjena cimarrona," "berenjena de marimbo" (Porto Rico); "güirito" (Cuba); "chicha" (Guatemala).

The fruit is said to be very poisonous. In Costa Rica a decoction of the leaves is employed as a remedy for diseases of the kidneys and bladder. In El Salvador the seeds are said to be used as a remedy for colds.

44. Solanum aculeatissimum Jacq. Icon. Pl. Rar. 5. *pl. 41.* 1781–86.

Veracruz. Florida, West Indies, Central and South America; also in the Old World tropics.

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[1] In Urban, Symb. Antill. 6: 206. 1909.

Plants suffrutescent, often procumbent, the branches densely covered with long prickles; leaves broadly ovate, 15 cm. long or less, acute, usually subcordate at base, lobate, the lobes acute or obtuse; inflorescences umbelliform, 2 to 5-flowered; corolla white, 1 to 1.5 cm. long; fruit orange, 2 to 3 cm. in diameter. "Berenjena" (Costa Rica).

45. Solanum chloropetalum Schlecht. Linnaea 19: 291. 1847.

?*Solanum porphyranthum* Dunal in DC. Prodr. 13[1]: 244. 1852.

Hidalgo and Veracruz; type from Jalapa, Veracruz. Guatemala.

Plants suffrutescent, the branches armed with long, straight or sometimes curved prickles; leaves rounded-ovate, long-petiolate, 16 cm. long or less, acute or obtuse, cordate at base, shallowly sinuate-lobate, armed with stout prickles on both surfaces; inflorescences few-flowered; corolla greenish white, 1 to 1.5 cm. long; fruit yellow.

Solanum globiferum Dunal, a West Indian plant, reported from Mexico by Schulz, is probaby not distinct.

46. Solanum hindsianum Benth. Bot. Voy. Sulph. 39. 1844.

Baja California and Sonora; type from Magdalena Bay, Baja California.

Shrub, 1 to 3 meters high, the branches finely stellate-tomentose. usually armed with long prickles; leaves petiolate, ovate to oblong, 4.5 cm. long or less, obtuse, rounded or subcordate at base, sometimes prickly beneath, covered with a dense close tomentum; inflorescence umbelliform, few-flowered; corolla light or dark violet, about 4 cm. broad; fruit about 1 cm. in diameter. "Mariola" (Baja California).

The plant is said to be employed in Baja California as an emmenagogue.

47. Solanum azureum Fernald, Proc. Amer. Acad. 35: 570. 1900.

Sinaloa; type from Topolobampo.

Shrub, the branches finely stellate-pubescent, armed with few slender prickles; leaves with numerous obtuse lobes, often prickly beneath, finely stellate-pubescent; peduncles with 10 or fewer flowers; corolla 4 to 5 cm. broad, violet; fruit 12 mm. in diameter.

48. Solanum amazonium Ker in Edwards, Bot. Reg. *pl. 71.* 1815.

Solanum obtusifolium Schlecht. Linnaea 5: 113. 1830. Not *S. obtusifolium* Dunal, 1813.

Solanum verae-crucis Steud. Nom. Bot. ed. 2. 2: 607. 1841.

Sonora and Chihuahua to Zacatecas, Oaxaca, Campeche, and Yucatán.

Shrub, the branches closely stellate-pubescent, usually armed with slender prickles; leaves ovate to oblong, 14 cm. long or less, obtuse or acute, obtuse to subcordate at base, sinuate or sinuate-lobate, sometimes entire, densely stellate-tomentose beneath and often prickly; inflorescences few-flowered; corolla blue or violet, commonly 4 to 5 cm. broad; fruit about 1.5 cm. in diameter. "Berenjena silvestre," "saca-manteca" (Sinaloa); "xkon-yakik" (Yucatán, Maya).

49. Solanum marginatum L. f. Suppl. Pl. 147. 1781.

Naturalized in the Valley of Mexico. Native of northeastern Africa.

Plants suffrutescent, 1 to 1.5 meters high, the branches white-tomentose, prickly; leaves oval or broadly ovate, 25 cm. long or less, obtuse, shallowly sinuate-lobate, armed with prickles, green and glabrate above, white-tomentose beneath; calyx prickly; corolla white, 2.5 cm. broad; fruit yellow, glabrous.

50. Solanum hispidum Pers. Syn. Pl. 1: 228. 1805.

Solanum chrysotrichum Schlecht. Linnaea 19: 304. 1847.

Michoacán to Veracruz and Chiapas. Guatemala; Peru (?).

Shrub, 4 meters high or less, the branches armed with short stout prickles; leaves ovate-oblong to broadly ovate, 20 cm. long or less, acute, obtuse to subcordate at base, subentire or usually lobate, often prickly, densely stellate-tomentose beneath, some of the hairs stipitate; corolla whitish, 12 to 15 mm. long; fruit 1 to 1.5 cm. in diameter. "Sosa" (Michoacán, Guerrero).

51. Solanum hernandesii Moc. & Sessé; Dunal in DC. Prodr. 13[1]: 266. 1852.

Chiapas. Guatemala to Nicaragua.

Shrub, the branches fulvous-tomentose, armed with stout prickles; leaves 13 cm. long or less, truncate or subcordate at base, prickly, 5 to 7-lobate, the lobes often again lobate, stellate-tomentose; inflorescences few or many-flowered; corolla white, 10 to 13 mm. long; fruit 1 cm. in diameter. "Huistomate," "güistomate" (El Salvador).

52. Solanum torvum Swartz, Prodr. Veg. Ind. Occ. 47. 1788.

Solanum ferrugineum Jacq. Pl. Hort. Schönbr. 3: 46. *pl. 334.* 1798.

Veracruz and Chiapas. Florida, West Indies, Central America, and northern South America; also in the Old World tropics.

Shrub, 1 to 4 meters high, the branches stellate-pubescent, armed with short prickles; leaves broadly ovate, 20 cm. long or less, acute or acuminate, usually rounded or subcordate at base, sinuate-lobate, stellate-tomentose, often prickly; cymes few to many-flowered; corolla white, 10 to 12 mm. long; fruit 1 to 1.5 cm. in diameter, yellow. "Tomatillo" (Guatemala); "berenjena" (Costa Rica); "berenjena cimarrona" (Costa Rica, Porto Rico); "pendejera," "prendedera" (Cuba); "friega-platos" (Colombia).

The names "espina" (Yucatán), "friega-platos" (San Luis Potosí), and "conoca" (Jalisco) are reported for this species, but they probably relate to other species.

53. Solanum madrense Fernald, Proc. Amer. Acad. 35: 558. 1900.

Sonora and Chihuahua to Morelos and Oaxaca; type from Sierra de Alamos, Sonora. Central America.

Shrub, 1 to 4.5 meters high, the branches fulvous-tomentose, armed with short stout prickles; leaves ovate or broadly ovate, 18 cm. long or less, acute or obtuse, usually subcordate at base, subentire to sinuate-lobate, densely stellate-tomentose beneath, often prickly; inflorescence few or many-flowered; corolla 1.5 to 2 cm. long, white; fruit 1 to 1.5 cm. in diameter. "Berenjena" (Durango); "huistomate," "güistomate," "güis," "lava-platos" (El Salvador).

54. Solanum mitlense Dunal in DC. Prodr. 13[1]: 314. 1852.

Guerrero and Oaxaca; type from Mitla, Oaxaca. Guatemala.

Shrub or small tree, 3 to 4.5 meters high, the branches densely and coarsely tomentose, armed with short prickles; leaves lanceolate to broadly ovate, 25 cm. long or less, obtuse to acuminate, acute to subcordate at base, shallowly sinuate-lobate, densely and loosely tomentose on both surfaces; cymes dense, many-flowered; corolla violet, 3 cm. broad; fruit 1 to 1.5 cm. broad. "Coyotomatl" (Puebla).

55. Solanum laurifolium Mill. Gard. Dict. ed. 8. *Solanum* no. 20. 1768.

Solanum lanceolatum Cav. Icon. Pl. 3: 23. *pl. 245.* 1794.

Solanum cymosum Ortega, Hort. Matr. Dec. 1: 11. 1797.

Solanum macrophyllum Dunal, Hist. Sol. 199. *pl. 17.* 1813.

Solanum mexicanum Moc. & Sessé; Dunal in Poir. Encyl. Suppl. 3: 770. 1813.

Solanum hartwegii Benth. Pl. Hartw. 68. 1839.

Solanum floccosum Mart. & Gal. Bull. Acad. Brux. 12[1]: 141. 1845.

Solanum molinum Fernald, Trees & Shrubs 1: 97. *pl. 49.* 1903.

San Luis Potosí to Morelos, Oaxaca, and Puebla. Martinique.

Shrub, 1 to 2.5 meters high, the branches stellate-tomentose, armed with few short prickles or often unarmed; leaves oblong, elliptic-oblong, or oblanceolate, 18 cm. long or less, obtuse or acute, densely stellate-tomentose beneath or finely stellate-pubescent, unarmed; cymes many-flowered; corolla pale blue, 12 to 15 mm. long; fruit 6 to 10 mm. in diameter.

56. **Solanum diversifolium** Schlecht. Linnaea **19**: 297. 1846.

Solanum torvum ochraceo-ferrugineum Dunal in DC. Prodr. **13**[1]: 160. 1852.

Solanum ochraceo-ferrugineum Fernald, Proc. Amer. Acad. **35**: 560. 1900.

Baja California and Sinaloa to Tamaulipas, Veracruz, and Oaxaca; type from Papantla, Veracruz. Central America.

Shrub, 1 to 3 meters high, the branches stellate-tomentose, armed with few short prickles or sometimes unarmed; leaves ovate-oblong to broadly ovate, 18 cm. long or less, acute or obtuse, usually sinuate-lobate but sometimes entire, stellate-tomentose, usually unarmed; cymes few or many-flowered; corolla white or bluish, 12 to 16 mm. long; fruit 1 to 1.5 cm. in diameter. "Salvadora" (Tamaulipas); "berenjena" (Sinaloa).

Palmer reports that in Tamaulipas the fruit is employed for poisoning rats.

9. ATHENAEA Sendtn. in Mart. Fl. Bras. **10**: 133. 1846.

1. **Athenaea nelsonii** Fernald, Proc. Amer. Acad. **35**: 567. 1900.

Type collected between Tumbala and El Salto, Chiapas.

Shrub (?), the stems viscid-villous; leaves petiolate, broadly ovate, 20 cm. long or less, cuspidate-acuminate, deeply cordate at base, entire or with a few sharp teeth, sparsely villosulous beneath; pedicels fasciculate, 3 cm. long or less; calyx glandular-villous, campanulate, with 5 narrow lobes; corolla 1.5 to 2 cm. long, yellowish, deeply 5-lobate; fruit red, inclosed in the calyx.

DOUBTFUL SPECIES.

ATHENAEA XALAPENSIS (H. B. K.) Hemsl. Biol. Centr. Amer. Bot. **2**: 422. 1882. *Withania xalapensis* H. B. K. Nov. Gen. & Sp. **3**: 13. 1819. Type from Jalapa, Veracruz.

10. WITHANIA Pauquy, Diss. Bellad. 14. 1824.

1. **Withania melanocystis** Robinson, Proc. Amer. Acad. **26**: 171. 1896.

Type from Tamasopo Canyon, San Luis Potosí.

Shrub, 1.5 to 2.5 meters high; leaves lanceolate or lance-oblong, 3 to 6 cm. long, acute, entire, petiolate, finely pubescent; pedicels axillary, fasciculate, 5 to 10 mm. long; calyx 5-dentate, accrescent, in fruit about 2 cm. long, bladder-like, contracted at the mouth; corolla rotate-campanulate, 1 cm. long, pale yellow with dark spots in throat, 5-lobate to the middle; fruit baccate, red, globose.

The true position of this plant is somewhat doubtful. The other species of the genus are natives of the Old World.

11. BRACHISTUS Miers, Ann. Mag. Nat. Hist. II. **3**: 264. 1849.

Shrubs or small trees; leaves entire; pedicels geminate or fasciculate; calyx short, broadly campanulate, with 5 to 10 setaceous or minute teeth, not or scarcely accrescent; corolla broadly campanulate, the limb 5-angulate or shallowly lobate; fruit a globose berry.

Larger leaves acutely acuminate_____1. **B. diversifolius.**
Larger leaves obtuse or obtusely short-acuminate_____2. **B. pringlei.**

1. **Brachistus diversifolius** (Klotzsch) Miers, Ann. Mag. Nat. Hist. II. 3: 268. 1849.

Witheringia diversifolia Klotzsch; Walp. Repert. Bot. 3: 29. 1844.

Veracruz, Morelos, and Chiapas.

Slender shrub, 1.5 to 2.5 meters high; leaves lanceolate or lance-ovate, 4 to 11 cm. long, acute at base, thinly pilose or glabrate, the pairs of leaves very unequal, one of each pair small and often obtuse; flowers long-pedicellate, the pedicels usually recurved; corolla greenish yellow, about 7 mm. broad; fruit 6 to 8 mm. in diamter.

2. **Brachistus pringlei** S. Wats. Proc. Amer. Acad. **25**: 159. 1890.

Nuevo León, Tamaulipas, and San Luis Potosí to Oaxaca; type from Sierra de la Silla, Nuevo León.

Slender shrub; leaves broadly ovate to oblong-ovate, 4.5 cm. long or less, abruptly contracted at base, sparsely pubescent or densely so beneath; corolla greenish yellow, 8 mm. broad; calyx lobes linear, somewhat elongate in fruit.

DOUBTFUL SPECIES.

BRACHISTUS LIGUSTRINUS (Dunal) Hemsl. Biol. Centr. Amer. Bot. **2**: 423. 1882. *Fregirardia ligustrina* Dunal in DC. Prodr. **13**[1]: 507. 1852. Type from "Desierto Viejo." Scarcely of this genus, but the generic position of the plant is doubtful.

12. BASSOVIA Aubl. Pl. Guian. 1: 217. 1775.

Shrubs or small trees; leaves entire or sinuate; pedicels usually fasciculate, sometimes umbellate; calyx broadly campanulate, 5 to 10-dentate or truncate, not or scarcely accrescent; corolla subrotate, cleft to the middle or lower; fruit a 2-celled globose berry.

Pubescence of the leaves of stellate hairs——1. **B. stellata.**
Pubescence of simple hairs.
  Leaves sinuate-dentate——2. **B. stramoniifolia.**
  Leaves entire.
    Stems setose-pilose——3. **B. setosa.**
    Stems glabrous or short-villous.
      Leaves barbate beneath in the axils of the lateral nerves——4. **B. foliosa.**
      Leaves not barbate beneath.
        Leaves glabrous beneath; corolla 12 to 14 mm. long.
          5. **B. escuintlensis.**
        Leaves sparsely short-villous beneath; corolla 6 to 7 mm. long.
          6. **B. mexicana.**

1. **Bassovia stellata** Greenm. Proc. Amer. Acad. **41**: 246. 1905.

Hidalgo and Veracruz; type from Trinidad Iron Works, Hidalgo, altitude 1,500 meters.

Shrub, 1 to 2 meters high; leaves ovate or oblong-ovate, 5 to 9 cm. long, acuminate, entire, glabrous above or nearly so, stellate-tomentose beneath or finally glabrate; flowers numerous, long-pedicellate; calyx with short rounded lobes; corolla 5 to 6 mm. long.

2. **Bassovia stramoniifolia** (H. B. K.) Standl.

Witheringia stramoniifolia H. B. K. Nov. Gen. & Sp. **3**: 13. 1819.

Brachistus stramoniifolius Miers, Ill. S. Amer. Pl. **2**: 7. 1849.

Bassovia donnell-smithii Coulter, Bot. Gaz. **16**: 145. 1891.

Tepic and Jalisco to Veracruz; type collected between La Banderilla and Jalapa, Veracruz. Guatemala and El Salvador.

Shrub, about 3 meters high; leaves ovate or ovate-elliptic, 5 to 11 cm. long, acute or acuminate, oblique and often subcordate at base, short-villous, especially beneath; corolla about 1 cm. long. "Belladona montés" (El Salvador).

3. Bassovia setosa T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 373. 1917.

Type from Zacuapan, Veracruz.

Low slender shrub; leaves lance-oblong or ovate-oblong, 3 to 4.5 cm. long, acute at base and apex, setose-pilose; flowers few, short-pedicellate; calyx with 5 lanceolate lobes; corolla about 6 mm. long, hirtellous; fruit 5 mm. in diameter.

4. Bassovia foliosa T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 373. 1917.

Type from Zacuapan, Veracruz.

Shrub; leaves oblong or ovate-oblong, 7 to 12 cm. long, short-acuminate, acute at base, glabrous except along the costa beneath; flowers umbellate, the umbels pedunculate, 5 to 7-flowered; calyx shallowly 5-lobate; fruit 5 mm. in diameter.

5. Bassovia escuintlensis (Coulter) Standl.

Brachistus escuintlensis Coulter, Bot. Gaz. 16: 144. 1891.

Bassovia purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 372. 1917.

Veracruz and Chiapas. Guatemala; type from Escuintla.

Shrub, the stems glabrous or very minutely puberulent; leaves ovate to ovate-oblong, mostly 10 to 25 cm. long, acuminate, abruptly decurrent at base, thin; flowers long-pedicellate, usually numerous; calyx truncate; fruit about 7 mm. in diameter.

6. Bassovia mexicana Robinson, Proc. Amer. Acad. 26: 171. 1891.

Nuevo León, San Luis Potosí, and Veracruz; type from Tamasopo Canyon, San Luis Potosí.

Shrub, 1 to 4.5 meters high, the branches glabrous or sparsely short-villous; leaves long-petiolate, broadly ovate to ovate-oblong, 5 to 17 cm. long, acuminate, usually obtuse or rounded at base; flowers numerous, long-pedicellate; calyx truncate; fruit 6 to 10 mm. in diameter.

Perhaps not distinct from *B. macrophylla* (H. B. K.) Benth. & Hook.

13. **LITHOPHYTUM** T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 188. 1911.

A single species is known.

1. Lithophytum violaceum T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 188. 1911.

Type from Santa Lucía, Puebla.

Shrub; leaves fasciculate at the nodes, oval, 4 to 7 mm. long, obtuse, entire, 3-nerved, glabrous, ciliolate; flowers pedicellate at the nodes; calyx 3 to 4 mm. long, campanulate, 5-lobate, puberulent; corolla 8 mm. long, violaceous, puberulent, salverform; anthers longitudinally dehiscent; ovary 1-celled, 2 to 4-ovulate.

It is not certain that the plant belongs to the Solanaceae. The material seen by the writer is too fragmentary for critical examination.

149. SCROPHULARIACEAE. Figwort Family.

Shrubs or more commonly herbs; leaves opposite or sometimes alternate or verticillate, entire or toothed (in the genera treated here), estipulate; flowers perfect, usually irregular; calyx inferior, 5-lobate or 5-dentate; corolla

gamopetalous, varying from rotate to funnelform, often bilabiate; stamens usually 4 and didynamous, attached to the corolla tube, the anthers commonly 2-celled; style simple; fruit capsular, many-seeded.

Numerous genera are represented in Mexico only by herbaceous species.

Leaves all alternate.
- Stamens 4; leaves entire ---- 1. LEUCOPHYLLUM.
- Stamens 2; leaves crenate ---- 2. GHIESBREGHTIA.

Leaves all or chiefly opposite.
- Capsule dehiscent by subapical pores. Corolla tubular, red. 3. GALVEZIA.
- Capsule dehiscent by valves.
  - Calyx 5-cleft nearly or quite to the base.
    - Sterile stamen present, nearly or quite as long as the fertile ones. 4. PENTSTEMON.
    - Sterile stamen none or minute ---- 5. RUSSELIA.
  - Calyx tubular or campanulate, the lobes usually shorter than the tube.
    - Pedicels bracteate; peduncles usually several-flowered.
      - Calyx tubular-campanulate, 5-dentate ---- 6. BERENDTIA.
      - Calyx campanulate, 5-lobate ---- 7. HEMICHAENA.
    - Pedicels ebracteate, 1-flowered ---- 8. DIPLACUS.

1. LEUCOPHYLLUM Humb. & Bonpl. Pl. Aequin. 2: 95. 1809.

Low shrubs, the pubescence of branched hairs; leaves alternate, entire; pedicels solitary in the leaf axils; calyx 5-cleft; corolla funnelform-campanulate, purple, the 5 lobes rounded, subequal; stamens 4.

The species listed are the only ones known.

Leaves green, glabrate.
- Corolla lobes glabrous within ---- 1. L. pringlei.
- Corolla lobes villous within ---- 2. L. laevigatum.

Leaves densely stellate-tomentulose, whitish.
- Corolla rather broadly campanulate, the lobes nearly equaling the tube. 3. L. texanum.
- Corolla narrowly campanulate, the lobes one-third to one-half as long as the tube.
  - Leaves acute or attentuate at base ---- 4. L. minus.
  - Leaves abruptly contracted and usually rounded at base. 5. L. ambiguum.

1. Leucophyllum pringlei (Greenm.) Standl.

Faxonanthus pringlei Greenm. Trees & Shrubs 1: 23. *pl. 12.* 1905.

Puebla; type collected on limestone hills near Tehuacán.

Shrub, 30 to 60 cm. high; leaves linear or spatulate-linear, 1.5 cm. long or less, acute or obtuse; sepals about 8 mm. long; corolla dark purple, 2 to 2.5 cm. long, barbate in the throat.

2. Leucophyllum laevigatum Standl., sp. nov.

Type collected between Ramos and Inde, Durango (*Nelson* 4689; U. S. Nat. Herb. no. 332744).

Young branches densely and finely stellate-tomentose; leaves oblanceolate-spatulate, 1 to 2 cm. long, 3 to 6 mm. wide, rounded or emarginate at apex, attenuate to a very short petiole, sparsely stellate-puberulent when young but soon glabrous; sepals linear, 2 to 3 mm. long; corolla narrowly campanulate, 1.5 cm. long, the lobes villous-barbate within, nearly as long as the tube; capsule about 6 mm. long.

3. Leucophyllum texanum Benth. in DC. Prodr. **10**: 344. 1846.

Coahuila, Nuevo León, and Tamaulipas. Western Texas; type from Laredo.

Shrub, sometimes 2.5 meters high, densely stellate-tomentulose throughout; leaves mostly obovate, 2.5 cm. long or less, obtuse or rounded at apex, acute at base, sessile or nearly so; sepals lanceolate; corolla 1.8 to 2.5 cm. long. "Cenizo" (Tamaulipas, Nuevo León, Texas); "palo cenizo" (Nuevo León); "hierba del cenizo" (Coahuila).

The plant is employed locally as a remedy for fever and ague. It is probably this species which was mentioned by Berlandier[1] as occurring in Texas where it was known as "cenicilla." Berlandier states that an infusion of the leaves was used by the Indians as a febrifuge. He proposed a new genus for the plant and called it *Teranea frutescens*, in honor of General Mier y Teran, the director of the expedition, but no formal description of the genus was published.

4. Leucophyllum minus A. Gray in Torr. U. S. & Mex. Bound. Bot. 115. 1859.

Chihuahua to Nuevo León and Zacatecas. Western Texas and southern New Mexico; type collected in Texas along the Pecos River.

Shrub, sometimes 1 meter high, finely stellate-tomentulose throughout; leaves spatulate-obovate, 13 mm. long or less, rounded at apex; sepals linear; corolla 1.8 to 2.5 cm. long, purple but often violet when dry.

5. Leucophyllum ambiguum Humb. & Bonpl. Pl. Aequin. **2**: 95. *pl. 109*. 1809.

Leucophyllum campanulatum Miers, Ann. Mag. Nat. Hist. II. **5**: 254. 1850.

Zacatecas to Hidalgo.

Shrub, 1 to 3 meters high, stellate-tomentose throughout; leaves petiolate, orbicular or broadly elliptic, 2 cm. long or less, rounded at apex; sepals linear-lanceolate; corolla about 1.5 cm. long.

2. GHIESBREGHTIA A. Gray, Proc. Amer. Acad. 8: 629. 1873.

A single species is known.

1. Ghiesbreghtia grandiflora A. Gray, Proc. Amer. Acad. **8**: 630. 1873.

Chiapas (type locality). Guatemala.

Tree, 7.5 meters high or less; leaves alternate, petiolate, elliptic or elliptic-oblong, 3 to 6.5 cm. long, obtuse, coarsely crenate above the middle, acute at base, pubescent; flowers solitary in the leaf axils; calyx 5-parted, the lobes linear or oblong, obtuse; corolla yellowish, about 6 cm. long, bilabiate, the upper lip erect, bilobate, the lower 3-parted; stamens 2; capsule 2 to 2.5 cm. long.

3. GALVEZIA Dombey; Juss. Gen. Pl. 119. 1789.

Plants suffrutescent; leaves mostly opposite, entire; flowers axillary or subracemose, red; calyx small, 5-parted; corolla tubular, the upper lip erect, bilobate, the lower lip trifid; stamens 4.

Leaves linear or oblong-linear ..... **1. G. juncea.**
Leaves oval to lanceolate ..... **2. G. glabrata.**

1. Galvezia juncea (Benth.) A. Gray, Proc. Amer. Acad. **22**: 311. 1887.

Maurandia juncea Benth. Bot. Voy. Sulph. 41. 1844.

Saccularia veatchii Kellogg, Proc. Calif. Acad. **2**: 17. 1863.

Baja California; type from Magdalena Bay.

Shrub 1 to 2.5 meters high, the branches terete, glabrous; leaves 1 cm. long or less, glabrous, soon deciduous; pedicels glandular-puberulent or glabrous; corolla 3 cm. long, short-pilose; capsule 6 to 8 mm. long, erect.

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[1] Diario de viage de la Comisión de Límites, p. 276. 1850.

2. Galvezia glabrata T. S. Brandeg. Zoe 5: 167. 1903.

Southern Baja California; type from San Felipe.

Plants suffrutescent, the branches sometimes scandent; leaves often ternate, petiolate, 1 to 3 cm. long, obtuse or acute, glabrous; pedicels glabrous; corolla 2 to 3 cm. long; capsule often cernuous.

Galvezia speciosa pubescens T. S. Brandeg.[1] is a pubescent plant which is probably a form of this species.

4. PENTSTEMON Schmidel, Icon. Pl. 2. 1762.

Shrubs or more commonly herbs; leaves opposite, entire or dentate; flowers showy, the peduncles usually branched and arranged in terminal thrysiform panicles; calyx 5-parted; corolla bilabiate, the upper lip bilobate, the lower trifid; perfect stamens 4.

Numerous herbaceous species occur in Mexico.

Leaves linear or nearly so.
- Corolla 3 cm. long, red ..... 1. P. pinifolius.
- Corolla 1.5 cm. long, pink ..... 2. P. linarioides.

Leaves oblong to broadly ovate.
- Leaves cordate or subcordate at base ..... 3. P. cordifolius.
- Leaves acute at base.
  - Corolla tubular ..... 4. P. baccharifolius.
  - Corolla funnelform ..... 5. P. antirrhinoides.

1. Pentstemon pinifolius Greene, Bot. Gaz. 6: 218. 1881.

Northeastern Sonora. Southern Arizona and New Mexico; type collected near Clifton, Arizona.

Plants woody below, about 30 cm. high; leaves narrowly linear, 2.5 cm. long or less, glabrous, very numerous and somewhat crowded, entire; corolla tubular, the lips short.

2. Pentstemon linarioides A. Gray in Torr. U. S. & Mex. Bound. Bot. 112. 1859.

Northeastern Sonora and mountains of Baja California. Western Texas to Arizona and Utah; type from Organ Mountains, New Mexico.

Plants often woody below, 30 cm. high or less; leaves about 1 cm. long, crowded, entire, minutely puberulent; corolla funnelform.

3. Pentstemon cordifolius Benth. Scroph. Ind. Introd. 7. 1835.

Northern Baja California. Southern California.

Plants suffrutescent, the stems long and subscandent, finely puberulent; leaves sessile or short-petiolate, ovate or broadly ovate, 4 cm. long or less, acute, serrate or denticulate, scabrous-puberulent; corolla tubular, bright red, 3.5 to 4 cm. long.

4. Pentstemon baccharifolius Hook. in Curtis's Bot. Mag. *pl. 4627*. 1852.

Pentstemon baccharifolius schaffneri Hemsl. Biol. Centr. Amer. Bot. 2: 443. 1882.

San Luis Potosí. Western Texas.

Plants suffrutescent, 60 cm. high or less, the branches glabrous or puberulent; leaves sessile or petiolate, oblong or elliptic-oblong, 5 cm. long or less, obtuse, entire or serrate, usually glabrous; corolla deep red, 2.5 to 3 cm. long.

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[1] Zoe 5: 167. 1903.

5. Pentstemon antirrhinoides Benth.; A. DC. in DC. Prodr. **10**: 594. 1846.

Baja California. Southern California.

Shrub, 1.5 meters high or less, the branches puberulent or glabrous; leaves elliptic to oblong, 1.5 cm. long or less, entire or serrate; corolla yellow, 1.5 to 2.5 cm. long.

5. RUSSELIA Jacq. Enum. Pl. Carib. 6. 1760.

REFERENCE: Robinson, Proc. Amer. Acad. **35**: 319–321. 1900.

Shrubs, the branches usually angulate; leaves opposite or verticillate, usually furnished with numerous resin glands; flowers red, mostly in cymes; calyx 5-cleft; corolla tubular, the limb somewhat bilabiate, 5-lobate, the lobes rounded; stamens 4.

Stems 4-angulate.
- Leaves entire.
  - Corolla about 18 mm. long ..... 1. R. subcoriacea.
  - Corolla about 13 mm. long ..... 2. R. campechiana.
- Leaves crenate or serrate.
  - Stems with thin wings along the angles ..... 3. R. tetraptera.
  - Stems not winged.
    - Calyx lobes gradually attenuate, the tips not subulate; flowers 2 to 2.4 cm. long ..... 4. R. jaliscensis.
    - Calyx lobes with subulate tips; flowers 1.5 cm. long or less.
      - Leaves cordate at base ..... 5. R. floribunda.
      - Leaves rounded to acute at base.
        - Larger leaves cuneate-attenuate at base ..... 6. R. cuneata.
        - Larger leaves rounded at base ..... 7. R. sarmentosa.

Stems terete or with 6 or more angles.
- Stems glabrous or very minutely puberulent.
  - Peduncles filiform, much elongate and exceeding the bracts, 1 to 3-flowered ..... 8. R. equisetiformis.
  - Peduncles short, the primary ones shorter than the subtending leaflike bracts, several or many-flowered.
    - Stems, at least the older ones, terete ..... 9. R. multiflora.
    - Stems conspicuously angulate.
      - Stems very minutely puberulent ..... 10. R. obtusata.
      - Stems glabrous.
        - Corolla 11 to 12 mm. long ..... 11. R. trachypleura.
        - Corolla 15 to 18 mm. long ..... 12. R. verticillata.
- Stems tomentose or pilose, the hairs conspicuous.
  - Larger stems conspicuously angulate ..... 13. R. polyedra.
  - Larger stems terete or nearly so.
    - Leaves entire ..... 14. R. purpusii.
    - Leaves serrate or crenate.
      - Leaves cordate and clasping at base ..... 15. R. rotundifolia.
      - Leaves obtuse or acute at base.
        - Corolla 8 to 9 mm. long ..... 16. R. tepicensis.
        - Corolla about 14 mm. long ..... 17. R. pringlei.

1. Russelia subcoriacea Robins. & Seat. Proc. Amer. Acad. **28**: 113. 1893.

Type from Tamasopo Canyon, San Luis Potosí.

Plants glabrous; leaves very short-petiolate, ovate, 6 cm. long, acuminate, lustrous above; calyx lobes acuminate.

2. **Russelia campechiana** Standl., sp. nov.

Type from Apazote, near Yohaltum, Campeche (*Goldman* 467; U. S. Nat. Herb. no. 396830).

Stems quadrangular, glabrous; petioles 7 to 9 mm. long; leaves ovate, 5 to 7.5 cm. long, 2.5 to 4 cm. wide, acuminate, rounded at base, coriaceous, entire, lustrous, glabrous; cymes many-flowered, equaling the leaflike bracts, short-pedunculate; calyx lobes ovate, subulate-acuminate; corolla 13 mm. long, the throat yellow-barbate.

3. **Russelia tetraptera** Blake, Proc. Biol. Soc. Washington **33**: 120. 1920.

Tepic; type collected near the city of Tepic.

Stems glabrous; leaves sessile or short-petiolate, deltoid-ovate, 7 cm. long or less, acute or acuminate; corolla 8 to 10 mm. long.

4. **Russelia jaliscensis** Robinson, Proc. Amer. Acad. **35**: 319. 1900.

Jalisco to Mexico; type from barranca near Guadalajara.

Stems glabrous; leaves rhombic-ovate or ovate, 3 cm. long or less, petiolate, thin, sparsely pubescent or glabrate; peduncles 2 or 3-flowered.

5. **Russelia floribunda** H. B. K. Nov. Gen. & Sp. **2**: 359. 1817.

Guerrero and Oaxaca; type collected between Río Papagallo and Venta de Tierra Colorada.

Stems glabrous or pubescent; leaves subsessile, rounded-ovate, obtuse or acute, 7.5 cm. long or less, coarsely crenate; corolla 1 cm. long.

Russelia syringaefolia Schlecht. & Cham.,[1] described from Papantla, Veracruz, is a closely related plant and perhaps synonymous.

6. **Russelia cuneata** Robinson, Proc. Amer. Acad. **44**: 613. 1909.

Michoacán or Guerrero to Oaxaca; type from El Ocote.

Plants suffrutescent, about 1 meter high, the branches glabrous; leaves sessile or short-petiolate, ovate or rhombic-ovate, obtuse, crenate; corolla about 1 cm. long.

7. **Russelia sarmentosa** Jacq. Enum. Pl. Carib. 25. 1760.

Veracruz and Yucatán. Central America; Cuba.

Stems glabrous; leaves short-petiolate, broadly ovate, 5 cm. long or less, acute, subcoriaceous, coarsely crenate-serrate; corolla about 1 cm. long. "Lluvia de coral" (Nicaragua).

8. **Russelia equisetiformis** Schlecht. & Cham. Linnaea **6**: 377. 1831.

Russelia juncea Zucc. Flora **1832**[2]: Beibl. 99. 1832.

Sinaloa (perhaps only cultivated) to Veracruz; type from Papantla, Veracruz. Guatemala.

Plants glabrous, herbaceous or suffrutescent; leaves small, ovate or lanceolate, caducous; inflorescence much branched; corolla usually 2 cm. long. "Arete de la cocinera" (Veracruz); "lluvia de coral;" "coralillo;" "lluvia de fuego," "coralitos" (Colombia).

A rather showy plant, common in cultivation in tropical and subtropical regions.

9. **Russelia multiflora** Sims in Curtis's Bot. Mag. *pl. 1528*. 1813.

Russelia paniculata Mart. & Gal. Bull. Acad. Brux. **12**[2]: 19. 1845.

Veracruz, Puebla, Oaxaca, and Chiapas. Guatemala.

Plants suffrutescent, 1.5 meters high or less; leaves short-petiolate, ovate, 6 cm. long or less, often ternate, acuminate; corolla about 1 cm. long. "Sapoyofillo" (Chiapas, *Seler*).

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[1] Linnaea **6**: 376. 1831.

10. **Russelia obtusata** Blake, Proc. Biol. Soc. Washington **33**: 119. 1920.

Puebla and Oaxaca; type from Tehuacán, Puebla.

Stems with much thickened, obtuse angles; leaves short-petiolate, ovate or elliptic, 3 cm. long or less, obtuse, crenate or serrate, obtuse or acute at base; calyx lobes acute; corolla 12 to 14 mm. long.

11. **Russelia trachypleura** Robinson, Proc. Amer. Acad. **36**: 474. 1901.

Type from Sierra de Tepoxtlán, Morelos, altitude 2,250 meters.

Stems 6-angulate, the angles roughened by small callosities; leaves short-petiolate, opposite or ternate, elliptic-ovate, 3 cm. long or less, obtuse or acute, serrate; calyx lobes caudate-acuminate.

12. **Russelia verticillata** H. B. K. Nov. Gen. & Sp. **2**: 360. 1817.

Russelia deamii Robinson, Proc. Amer. Acad. **36**: 474. 1901.

Chihuahua and Durango to Guerrero and Morelos; type from Puente de la Madre de Dios. Central America.

Stems 6-angulate; leaves short-petiolate, ovate or elliptic, 2.5 cm. long or less, obtuse or acute, thin, serrate, glabrous or villous.

Russelia deamii is a form with villous leaves. It may be specifically distinct, but it seems more probable that it is only a form of *R. verticillata*.

13. **Russelia polyedra** Zucc. Abh. Akad. Wiss. Muenchen **2**: 328. 1832–36.

Russelia retrorsa Greene, Pittonia **1**: 176. 1888.

Baja California and Sonora to Tamaulipas, Veracruz, and Chiapas. Central America.

Plants suffrutescent, 2.5 meters high or less, the stems 6-angulate, sparsely or densely pubescent; leaves short-petiolate, ovate or broadly ovate, 6 cm. long or less, acute, rounded to acute at base; corolla about 1.5 cm. long. "Hierba de la sueña" (Tamaulipas); "coral de la playa," "coral" (Oaxaca).

It is probable that the proper name for this species is *R. ternifolia* H. B. K.[1] The description of that species agrees well with *R. polyedra* except that the leaves are described as larger than in any specimens seen by the writer.

14. **Russelia purpusii** T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 385. 1913.

Type from Baños del Carrizal, Veracruz.

Branches densely pubescent; leaves ovate, 6.5 cm. long or less, acuminate, subcordate at base, short-petiolate, pubescent beneath; calyx lobes ovate, subulate-acuminate; corolla about 1.5 cm. long.

15. **Russelia rotundifolia** Cav. Icon. Pl. **5**: 9. *pl. 415.* 1799.

Guerrero.

Shrub, the branches densely pubescent; leaves reniform to rounded-ovate, sessile, 8 cm. long or less, obtuse or rounded at apex, coriaceous, densely pubescent beneath and with prominent and reticulate venation; corolla about 1 cm. long.

16. **Russelia tepicensis** Robinson, Proc. Amer. Acad. **35**: 321. 1900.

Russelia furfuracea T. S. Brandeg. Zoe **5**: 219. 1905.

Sinaloa and Tepic; type from Zopilote, Tepic.

Stems striate, densely pubescent; leaves sessile or short-petiolate, mostly ternate, ovate to rounded-ovate, 4.5 cm. long or less, obtuse, rounded to acute at base, crenate or serrate; flowers in short dense cymes.

17. **Russelia pringlei** Robinson, Proc. Amer. Acad. **43**: 26. 1907.

Guerrero; type from limestone cliffs of Iguala Canyon, altitude 750 meters.

Plants 1 to 2 meters high, the stems densely pubescent, striate; leaves short-petiolate, ovate, 1 to 1.5 cm. long, acute, serrate, densely glandular beneath; cymes short, few-flowered.

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[1] Nov. Gen. & Sp. **2**: 359. 1817.

6. **BERENDTIA** A. Gray, Proc. Amer. Acad. 7: 379. 1868.

Shrubs; leaves opposite, entire or toothed; peduncles axillary, 1 to 5-flowered; calyx tubular-campanulate, 5-dentate, 5-costate; corolla tube ampliate above, the limb bilabiate, the lobes spreading; stamens 4.

The species listed are the only ones known.

Plants glabrous----------1. **B. levigata.**
Plants copiously pubescent.
  Peduncles mostly 3 to 5-flowered----------2. **B. coulteri.**
  Peduncles 1-flowered.
    Flowers 3.5 to 5 cm. long----------3. **B. rugosa.**
    Flowers about 1.5 cm. long----------4. **B. spinulosa.**

1. **Berendtia levigata** Robins. & Greenm. Proc. Amer. Acad. **32**: 39. 1896.

Puebla; type from Tehuacán.

Shrub, 1 meter high or less; leaves ovate-elliptic to lance-oblong, 4.5 cm. long or less, short-petiolate, acute, dentate above the middle; peduncles 1-flowered; corolla about 4 cm. long, orange with crimson spots.

2. **Berendtia coulteri** A. Gray, Proc. Amer. Acad. **7**: 380. 1868.

The type locality is not stated by Gray; Hemsley gives it as "Zimapán and San Blas to Guadalajara."

Leaves oblong or obovate, nearly entire; corolla tube scarcely exserted from the calyx, the limb about 12 mm. broad.

3. **Berendtia rugosa** (Benth.) A. Gray, Proc. Amer. Acad. **7**: 380. 1868.

Diplacus rugosus Benth. in DC. Prodr. **10**: 368. 1846.

Berendtia ghiesbrechtii A. Gray, Proc. Amer. Acad. **7**: 380. 1868.

Chiapas.

Plants villous; leaves ovate or obovate-oblong, 3.5 cm. long, crenate-dentate above the middle; corolla tube 3 times as long as the calyx; corolla "scarlet."

4. **Berendtia spinulosa** S. Wats. Proc. Amer. Acad. **25**: 159. 1890.

Known only from the Sierra Madre near Monterrey, Nuevo León, on limestone ledges.

Much-branched shrub, glandular-hispidulous throughout; leaves linear-oblanceolate to elliptic-oblong, acute or obtuse, sessile or short-petiolate, entire or with a few obscure teeth, the margins revolute; corolla yellow.

7. **HEMICHAENA** Benth. Pl. Hartw. 78. 1841.

A single species is known.

1. **Hemichaena fruticosa** Benth. Pl. Hartw. 78. 1841.

Leucocarpus fruticosus Benth. in DC. Prodr. **10**: 336. 1846.

Oaxaca and Chiapas. Central America; type from Quezaltenango, Guatemala.

Plants herbaceous or suffrutescent, about 1 meter high, viscid-villous, the branches terete; leaves opposite, ovate-oblong or oblong-lanceolate, 12 cm. long or less, acute or acuminate, sessile and clasping, dentate; flowers in few-flowered pedunculate axillary cymes; calyx campanulate, 5-lobate, scarcely angulate; corolla about 4 cm. long, the tube broad, the limb 5-lobate, bilabiate; stamens 4.

8. DIPLACUS Nutt. Ann. Nat. Hist. 1: 137. 1838.

Shrubs; leaves opposite, entire or toothed; flowers axillary, solitary, large and showy; calyx tubular, 5-angulate, obliquely 5-dentate; corolla funnelform, the limb bilabiate, the upper lip bilobate, the lower 3-lobate; stamens 4.

The species of this genus are often placed in *Mimulus*.

Corolla red----------1. D. puniceus.
Corolla yellow----------2. D. longiflorus.

1. **Diplacus puniceus** Nutt. Ann. Nat. Hist. 1: 137. 1838.

Northern Baja California, ranging from sea level to 900 meters. Southern California; type collected near San Diego.

Shrub, about a meter high; leaves sessile, linear to linear-oblong, 6 cm. long or less, entire or serrate, glutinous and sometimes sparsely pubescent beneath; flowers pedicellate, the calyx glabrous or nearly so; corolla 3.5 to 4.5 cm. long.

2. **Diplacus longiflorus** Nutt. Ann. Nat. Hist. 1: 139. 1838.

Diplacus stellatus Kellogg, Proc. Calif. Acad. 2: 18. 1863.

Diplacus arachnoideus Greene, Bull. Calif. Acad. 1: 210. 1885.

Baja California. Southern California; type from Santa Barbara.

Shrub, 1 to 1.5 meters high; leaves linear to ovate-oblong, 5 cm. long or less, sessile or short-petiolate, entire or nearly so, usually with sparse pubescence of branched hairs beneath; calyx often villous; corolla 3.5 to 5.5 cm. long.

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